

NO.
62

THE MAGAZINE OF TOMORROW

AUTHENTIC SCIENCE

FICTION MONTHLY

2/-



articles • HUMAN CENTRIFUGE • TOOLS FOR TOMORROW
stories • HEADS IN THE FUTURE • ROBOTS TO BUY
By Burke, Bounds, Shaw, Presslie, etc.

ISSUE No. 62

AUTHENTIC SCIENCE

FICTION MONTHLY

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H. J. Campbell writes

ALL THE WORLD IS NOW aware that the era of space conquest is very nearly upon us. News of the attempt to launch an artificial satellite during the International Geophysical Year has flashed around the world, among all races and among all classes. The reception of the news was varied. Some hailed it as, perhaps, the most important step in man's progress towards a true civilisation. Others became fearful and saw the bright new moon as the first step in a chain of human relations that may ultimately lead to world war and possibly world slavery.

Those more thoughtful and less impulsive considered that this new accomplishment was not qualitatively different from most other decisive human achievements. Like them, the artificial moon was a mere potential; it could auger ill or well, depending upon how it was used.

But on one point feeling was unanimous. *The satellite must be used for good or bad; there is no indifferent course.*

That is the way, too, with all important discoveries and achievements. They cannot be ignored. When man takes one step he must follow with others.

Behind the scenes, reported only in a scattering of books and journals read by "cranks and dreamers," work on space travel is far in advance of this tiny satellite unmanned. Money, not knowledge or materials, is the great barrier to progress with space travel. One nation, even be it as mighty as the leading Powers, can scarcely endanger its economy to the extent of financing a really big space-conquest venture. Only the combined resources of many nations can bring this about.

In the International Geophysical Year we have scientists and governments of about forty nations co-operating for the common pursuit of progress. It is good that space conquest has been included in the programme of work. During the Year much goodwill can be engendered among the several races. Space travel will be widely and intelligently reported as linked with men whose sanity is beyond dispute.

It may be that Science, during the Year, will repay to humanity some of its enormous debt—by being instrumental in uniting the races of the world in a common imperative cause. H.J.C.

About the cover . . .

. . . Guided Missiles

ONCE AGAIN WE BRING YOU information on a behind-the-scenes activity relating conventional aviation to space travel. Our cover shows an airman undergoing training in the "human centrifuge" which you can read about on page 14.

It is well-known that when a spaceship blasts off, its occupants are subjected to terrific pressures due to the race against gravity. Much the same kind of pressures occur in modern superspeed jet planes—especially fighters and small bombers coming out of fast dives. The human centrifuge is designed to find out just how much of such pressures men in different bodily states can stand.

This type of thing is all the rage in modern aviation medicine. Air Force doctors and physiologists, with the intelligent man's eye on the future, are putting their human guinea pig volunteers through all kinds of physical and psycho-

logical testing. Rigorous and ruthless, the tests are planned to determine the utmost limits of human endurance—and to find ways of raising those limits.

It has not yet been shown precisely what kind of a man may be best suited to life under space travel conditions, and such discoveries may well be kept secret under the present security blanket that covers work of this kind. But probably enough has been done to give the lie to the space opera hero who is big and broad and brawny. Presence of mere muscle is hardly likely to befit a man for the privations of space.

Most interesting of all, we think, is the work being done in testing mental endurance. However perfect his body may be, a spaceman is no use if he is going to crack up mentally.

We hope to bring you more information on this subject in a later issue.

Aviation research has a new tool—

The HUMAN CENTRIFUGE

which can simulate a force thirty times
the strength of gravity

TRAINING FOR THE 1929 SCHNEIDER Trophy races, the pilots, for the first time in history flying aircraft at 350 miles an hour, came up against a problem which became so rapidly more formidable that today it demands a full-scale research programme.

That problem, basically, was the physiological behaviour of men when subjected to high "g." During the

second world war, blackouts of pilots flying fast fighter aircraft became more frequent and more dangerous as aircraft speeds increased. Little could be done about this problem at that time in England, although research was carried out in the United States and in Canada.

It is but a short, logical step from the problems encountered in flying



General view of the centrifuge



Changing the cams that control acceleration

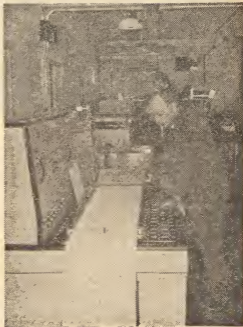
the medical scientists who study aviation medicine can discover about the function—or disfunction—of men's bodies in these abnormal conditions will prove of tremendous value when the first true spaceships come to be launched.

On May 17th Viscount Thurso declared open Britain's first man-carrying centrifuge at the

high speed aircraft in turns and pulling out of dives, to the similar difficulties which will be experienced by the first men who blast off from the Earth for space. The test pilots of today are indeed the fore-runners of the spacemen.

When the human organism is subjected to a rapid change of course at high speed blood tends to drain away from the head and brain and pool in the lower abdomen and the legs. The consequent lack of blood to sustain the controlling mind of the subject causes blackout and loss of control. The whole purpose of putting that man and that ship in that particular area of sky is rendered valueless.

Spaceship crews will have to face a similar problem, although here the duration will be longer, and the force exerted will come in a single direction. Whatever



The control cabin

Institute of Aviation Medicine at Farnborough.

This bald statement covers an act of immense significance in the conquest of space. Although there are human centrifuges elsewhere in the world, the new British one is the finest in Europe—possibly even in the world—and certainly has the most efficient electronic recording equipment. The Institute of Aviation Medicine has a glorious record of achievement in the

at each end. These gondolas are swung on gimbals so that they tilt under speed and maintain the force of apparent gravity in a constantly downwards direction relative to the subject within.

The arm is 62½ feet long and 9½ feet in square cross section, constructed from tubular steel and light alloy. To rotate this 42 ton mass calls for a D.C. electric motor putting out 2,200 h.p. The maximum speed of

rotation attained is 54.4 revolutions per minute, achieved in nine seconds from rest, which swings the gondolas at 115 miles per hour.

At this speed the gondolas, which weigh 1,150 lbs., just over half a ton, have the apparent weight of over fifteen tons.

The radial acceleration is thirty times the force of Earth gravity. The gondolas are being subjected to 30g.

It is not intended that air force personnel should be subjected to this crushing load. Volunteers will whirl round at 10g, and may even attain 12-15g in the supine position. When it is borne in mind that few men can stand even 5g without some mechanical aid, and that most blackout at 3-3.5g, the reasons for this are obvious. Most pilots can withstand a force of 6g if they are suitably protected by an anti-gravity suit. This constricts the legs and abdomen and so limits that collection of blood in the lower part of the body that robs the brain. An odd fact, here, is that blackout tolerances vary not only from pilot to pilot, but from day to day with the same man.



Observer's view of the gondola

face of inadequate equipment. To test various types of life-saving jackets one officer was anaesthetised and thrown into a pool of water time after time. Another sustained over 200 blackouts, many ending in unconsciousness, in the attempt to understand what flying men were up against.

Now, the new man-carrying centrifuge puts this sort of experiment onto strict scientific lines. The only other centrifuge with its performance is the U.S.N. version in Philadelphia.

The centrifuge looks like a swing bridge, which goes on swinging, round and round, until it attains the speed of 115 miles an hour at its extremities. There is a gondola, or enclosed cabin,

With the subject in the gondola, the observer perched on the arm near its centre looking through the perspex panels of the cabin, the controller in his cubicle overlooking the vast room containing the centrifuge, and the recorder tucked away in his laboratory at the top of the building, what is likely to be the result of all this vast expenditure of energy and public money?

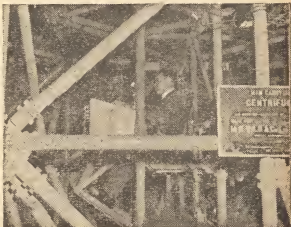
As the subject endures more and more gravity force, his reactions are being closely studied and recorded. From these intricate charts will come a greater knowledge of just what man is up against when he flies above the speed of sound at great heights over the Earth. And, inevitably, what he must expect to face when he blasts off for the stars.

A cine camera is mounted to photograph the subject's bodily reactions. The arterial blood-pressure is recorded by a capacitance manometer through an intra-arterial cannula. To estimate head blood flow a recording is made of the opacity of the lobe of the ear photo-electrically. The pulsation of the ear lobe is also recorded. Electrodes are attached to the body over the lungs and heart. And, there are recordings made of the acceleration of the pilot, pressure in the anti-gravity suit and the angle of tilt of the gondola.

All these recordings, which may be aken relatively easily in the gondola, have to be channelled out so that the scientists may study and record them. But the gondola is swinging round at

50 miles an hour. The problem becomes suddenly acute.

To overcome this difficulty an ingenious system of wiring was developed. Wires run along the arm of the centrifuge, up through a hollow shaft in the centre of the arm. Here a system of 60 silver sliprings each with 2 silver-carbon brushes leading to 30 mercury troughs, each with a spade-type collector convey the information through to the floor above.



Observer's position under the arm

Perhaps the most interesting feature of the new centrifuge is the opportunity to study men's reactions to normal work whilst under high gravity strains. The gondolas may be removed and replaced by two boxes with the same cross-section size as the arm, with a wooden floor and duralumin walls, lined with sponge rubber. They can be rotated up to 10g. Within these spinning boxes men can be observed carrying out the various duties that they may be called upon to perform when in flight miles above the Earth's surface.

The scientists at Farnborough envisage experiments involving the stand-

Continued on page 13

The way to the Planets

by A. E. ROY, B.Sc., Ph.D., F.R.A.S., F.B.I.S.

5—*Laboratory in Space*

WHAT, ASKS MY 'practical' friend, is the use of a space station? One thousand million dollars seems to me, he goes on, a lot of useful cash to expend in establishing a bunch of scientists in an orbit outside the Earth's atmosphere, not to mention the materials and fuels used up in the process.

If my friend is a short-sighted individual who always requires a quick, concrete return for his money, he is going to be disappointed with most of my answer; if his formative years have been properly spent reading the best science fiction (no names please!), he will be quite happy with my answer. What, to paraphrase an old question, has a laboratory in space got that ordinary laboratories haven't?

Firstly, it will be the only place where conditions of no-gravity can be studied for any length of time. Gravity has been the most intractable of all the physical forces since

Newton and Galileo laid the foundations of modern science three hundred years ago. The surface resemblance between it and magnetism does not give one any means of increasing it or decreasing it at will, though, for over a century, electric means have been used to vary magnetic fields and vice versa. Most of what we know about the force of gravity can still be summed up in Newton's famous law stating that the force of gravitational attraction between two bodies of masses m_1 and m_2 separated by a distance d equals Gm_1m_2 divided by d^2 , where G is a universal constant. The law has been proved to hold, except where relativistic corrections are appreciable, over most of the known universe. Whether gravitic waves, like electro-magnetic waves, travel with the speed of light has not been established.

It might be supposed that by placing large quantities of material between the masses

m_1 and m_2 the force of attraction between them would be varied. In other words, if gravitic waves exist, is matter transparent or opaque to them? Many experiments have been carried out to investigate this. Since the masses were not being varied, or the distance between them, possible variations in the value of G , the universal constant, were being investigated. Eotvos, Majorana, Austin and Thwing interposed layers of very dense materials, such as mercury or lead, between the attracting bodies with completely negative results. Again, G does not vary even if we change the material composing the attracting masses. It does not seem to matter what temperature they are heated to, or whether they are radioactive or not.

The discovery of the laws of relativity has changed the attitude of scientists to gravitation, linking it now to the properties of space-time as these properties are modified by the presence of matter or energy. But why space-time should be so "warped" in the vicinity of matter or energy is still completely unknown.

It may be, then, that fresh light on this mysterious phenomenon will be shed by

experiments conducted over long periods of time in the conditions of no-gravity at the hub of the space station or outside it in the orbit. If some means could be found of varying a gravitational field as easily as we vary a magnetic one, our industries and transport methods would be revolutionised.

There are two other sciences that will benefit by work done on the station in no-gravity conditions. Firstly, space-medicine will learn once and for all whether spacemen can stand indefinitely free-fall. At the present date, the longest time spent by humans and animals in no-gravity conditions has been a few minutes. These experiments have tended to show that human beings are not incapacitated by such conditions, but it will take the building of the space station to find out if there is a time limit to the period spent in free-fall without harmful effects. Secondly, the science of biology will benefit. Arthur C. Clarke has pointed out in this connection that gravity is an important factor determining the possible size of micro-organisms and, indeed, larger creatures. In conditions of no-gravity such creatures may change in surprising and

informative manners. Again the rate of growth of plants and animals may well depend on the force of gravity. If a seed-root grows "downwards," what is it going to do when there is no "downwards"? In this connection the effect of the cosmic rays, unscreened by the Earth's atmosphere, may be of importance. Thus a visitor to the space station may well find it an unforgettable experience to be shown round the biological and botanical laboratories.

What other conditions are present or may be induced in the artificial satellite that are difficult or impossible to achieve on Earth? The three most obvious and most useful from the point of view of the physical sciences are heat, cold and vacuum.

At the Earth's distance from the Sun, 93,000,000 miles, we enjoy moderate temperatures, due to the protection of the Earth's atmosphere. On the Moon, roughly at the same distance from the Sun, the temperature on the sunlit side can rise to just over 100° Centigrade—the boiling point of water—while on the dark side it can fall to minus 120° Centigrade. Willy Ley was among the first to point out

that much higher temperatures or much lower ones could be easily produced on a space station. If the Sun's rays were concentrated by means of a mirror, a temperature far exceeding that of an electric arc could be produced for any length of time while, by shielding off a volume of space from the Sun's radiation, that volume would itself radiate away its heat to the rest of space until its temperature approached minus 273° Centigrade, the lowest possible temperature.

The vacuum would be "harder" than the best vacuum man has yet produced on Earth. Not only that, but it would be limitless in extent and require no pumps to keep it in being! By screening off any section of it from the solar radiation, a vacuum tube could be produced by setting up two electrodes any distance apart. The "dees" of a cyclotron or synchrocyclotron or any of their numerous descendants would not require air-evacuation apparatus if constructed in the station or near it.

It must be noted here that very probably more than one station will be set in position, the chosen orbit and design of station depending on the

specific task for which it is intended. For example, a meteorological station may be placed four thousand miles up to survey a large area of the Earth's surface in a few hours, while a re-fuelling station may be only five hundred miles above the Earth's surface.

It seems likely that radio and television will benefit greatly by the establishment of the artificial satellite. Arthur Clarke has described the uses of a system of such relay stations set in an orbit 22,000 miles above the Earth's equator. In such an orbit the time of revolution would be 24 hours, so that if a station was once above a particular spot on the Earth's surface it would remain there. Clarke suggests that three of these stations, equally spaced in the orbit, would be sufficiently numerous to completely cover the Earth. This would make practicable a world-wide system of television. Again, such stations would serve as relays when interplanetary travel has been established. A radio station on Earth, for example, would beam its message to the artificial satellite directly overhead; there the message would be "washed and brushed-up" and transmitted across space

to a Martian artificial satellite and from thence beamed down to the radio station directly below.

In a paper presented at the Third Symposium on Space Travel at the Hayden Planetarium and, thereafter, published in the *Journal of the B.I.S.*, Dr. Harry Wexler, Chief of the Scientific Services Division, U.S. Department of Commerce, Weather Bureau, declared: "An artificial satellite, moving about the Earth at the proper height, would be of inestimable value as a weather patrol for short-range forecasting and as a collector of basic research information for solar and geophysical studies, including long-term weather changes and climatic variations."

Dr. Wexler, in his very detailed study of the problem, listed a number of properties the Satellite Weather Station should have if it is going to do its job properly. It should be high enough to give at any instant a field of view comparable in size to North America and the adjacent ocean areas. It should not be so high that cloud areas and geographical features are not easily identifiable. It should move in such a manner that the same cloud system is in

the field of view at least twice in twelve hours so that a track of the storm associated with the cloud system can be obtained. It should not move too fast so that individual cloud systems cannot be placed accurately with respect to known ground features. It should cover the whole Earth in daylight at least once daily. Since new storms usually move from west to east, the station should have a westward component of velocity relative to the Earth's surface. These conditions make Dr. Wexler place his satellite station about 4,000 miles above the Earth's surface with a period of rotation of four

hours. He chooses, in addition, an orbit whose plane includes the poles of the Earth so that, as the Earth rotates below the orbiting station, the total surface area comes into view successively.

Dr. Wexler concludes that such a station would play a very valuable role in meteorology in tracking storm centres and issuing warnings. Many million pounds may be saved annually by such a system, thus satisfying to some degree my practical friend. Next month we shall see in what far-reaching ways the space station will aid the queen of the sciences—Astronomy.

NEWS

TAPPING THE SUN

IT IS WELL KNOWN THAT THE Sun's energy is the ultimate source of the mechanical energy employed in industry, transportation and communication. The energy released when coal and oil are burned is due to sunlight stored in vegetation hundreds of thousands of years ago while the electrical and mechanical

energy produced from winds and waterfalls is also due to the Sun's heat. The energy reaching the Earth's surface due to the Sun has been estimated to be equivalent to 5,000,000 horsepower per square mile! It is, therefore, not surprising that, for many years, inventors have tried to build solar engines for utilising

more directly some small part of that abundant power. Some have used parabolic mirrors to reflect and focus the Sun's rays onto a boiler, and a number of these engines are in daily use in California, Egypt and the Pyrenees. We have seen, too, (*Authentic*, September, 1955) that it has been suggested that such a solar engine, on a larger scale, may supply power for the space station.

But from recent work it looks as if the giant mirror and boiler will be obsolete before it is constructed. At a demonstration in the U.S.A., a power-generating photocell was shown which uses silicon, the second most abundant element in the Earth's crust, as a semi-conductor. Sunlight falling on an area of about one square inch produced a current of 24 milliamperes at 0.5 volts. The efficiency of this device was six per cent., so that six per cent. of the Sun's energy was being converted to electrical energy. Another device, having an area of about 40 square inches, provided the power required by a transmitter of several miles range.

Although these new photocells are in an early stage of development, they are far more efficient than ordinary photocells and thermocouple power converters. If their descendents are used in the space station, it is possible that much of the power generated by them will be stored for future use in a new type of secondary cell now coming into commercial use. This battery consists of nickel and cadmium as active materials, and potassium hydroxide as electrolyte. Compared with ordinary accumulators of similar capacity, the new battery has the following advantages: it is about one third to one half the size, has from five to ten times the working life, has a much wider range of operating temperatures and greater resistance to ill-treatment. It cannot be ruined by overcharging or short-circuiting it. Thus, by installing these cells in, say, the unmanned artificial satellite, it will still be able to transmit information while it is in that part of its orbit within the Earth's shadow cone. A.E.R.

SELENIUM

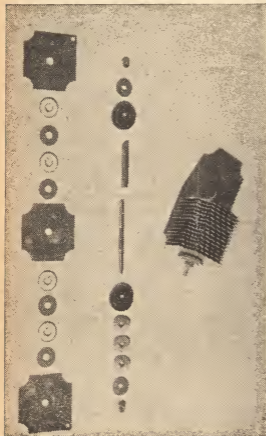
by W. W. BYFORD, B.Sc.

AMONG METALS SELENIUM AND ITS chemical twin tellurium are odd men out. In the first place selenium is only a metal sometimes. Much of its time it pretends to be

sulphur. Its atoms are far from identical, no less than six different-sized atoms being present in detectable numbers in a given specimen of the element. These isotopes vary in atomic weight from 74 to 82, giving an average value for the atomic weight of selenium as 78.96.

Tellurium was isolated by Klaproth and christened by him in 1798 from the Latin word *tellus* meaning "the earth." Berzelius, in 1817, experimented with a red powder which had been found in a lead chamber producing sulphuric acid. The sulphur dioxide in use on the plant had been obtained by burning copper pyrites in which something that was not sulphur had been acting as though it were. From the red powder Berzelius isolated the first selenium and gave it that name because he recognised it as akin to tellurium, that is to say he named it after the moon, using Greek instead of Latin for a change.

Pure selenium can be obtained in three different forms, de-



Components of a Westalite selenium rectifier



The repeater station at Ryde, Isle of Wight, uses selenium rectifiers in large numbers

pending upon whether it is one of the times when it is going to be a metal or whether it is one of the times when it won't. Two of the forms of selenium are not a bit like a metal. One of them is vitreous and dissolves in carbon disulphide which, on evaporation, gives the other non-metallic form in little crystals like those of sulphur but red in colour instead of yellow. If either of these forms are heated they are converted into the third form of selenium, which is metallic.

It is characteristic of metals that they are good conductors of electricity. Sulphur is decidedly a non-metal and is widely used as an insulator because it will not conduct electricity. The sulphur-like form of selenium is non-metallic. The so-called metallic form of selenium will sometimes conduct electricity moderately well as though it were a metal, and sometimes only very feebly as though it were a non-metal. How does it make up its mind when to be which? Well now, that is just what is interesting about selenium and it is also what makes it decidedly useful in a way that is all its own.

In the dark it has a high resistance to

the passage of electricity, but when it is brought forth into the light of things the atoms of selenium behave as good little metal atoms should and freely pass electrons from one to another.

How can we make use of such behaviour? Suppose a piece of selenium forms one part of an electric circuit. While it is in the dark it is acting virtually as an open switch and no appreciable

current flows. Now suppose it is illuminated for a period of time. The conductivity of selenium rapidly increases and a flow of current builds up in the circuit. If the source of light is now cut off the selenium atoms not quite so quickly resume their obstructive attitude and the current falls off and soon ceases to flow. Now, if in the rest of the circuit there are other devices operated by electric current they will be working when light falls



Arc lamps in modern cinema projectors use selenium rectifiers

on the selenium and will cease to function when the light is removed.

A very simple application of the photo-electrical property of selenium is made in a certain type of burglar alarm. A burglar enters a darkened room and shines his torch onto the lock of the safe. The beam of his torch falls on a little selenium cell which, in the darkness, is an obstruction in a circuit containing an electric bell. The light of the torch allows current to pass through the selenium, and the bell begins to ring. So the burglar switches off his torch and very soon afterwards the selenium stops being a metal and the bell stops ringing. But suppose the bell had been replaced by a red light bulb in the watchman's office or in the local police station. Then the burglar continues working blissfully unaware that he is himself declaring his presence.

The circuit which contains a selenium cell may itself be operated by quite a small source of current, but may contain an electro-magnet which will pull a switch either on or off in a second circuit which may be much more highly powered. Thus a street lamp may be connected to the normal electricity mains supply and be fitted with a switch which is operated electro-magnetically by a small power circuit which contains a selenium cell. So long as it is daylight the selenium cell allows current to pass through the electro-magnet (or other device) which keeps the street lamp switched off. When darkness falls the selenium cell ceases to function as a conductor, the electro-magnet fails and the lamp switch closes and the street is illumi-

nated. At dawn the reverse happens on re-illumination of the selenium cell which, of course, is screened from the street lamp but exposed to the light of the heavens. The same principle has been used at sea for lights on buoys.

The speed and strength of the selenium cell's reactions to variations in the intensity of illumination falling on it is quite subtle. Moreover, these variations in a small power circuit can be readily amplified to match in a higher powered second circuit. The selenium cell can, therefore, be made to scan an illuminated photograph in Manchester and cause current to flow in a telegraph wire to London, where it will cause a light of varying intensity to scan a photographic plate which, on developing, reproduces in London the photograph which is in Manchester.

Many other simple uses have been made of the photo-electric cell, such as detection of smoke, counting of articles on a moving belt and of visitors to exhibitions, etc., opening of doors by approaching entrants and for perforated tape sound recordings. It is also used to measure the intensity of light for photographic purposes. The advent of the talking picture brought the need for projection of sound by light in order to synchronise sound with pictures, and selenium cells have been used for the purpose. Television has also been accomplished by its aid, but the time-lag of the selenium cell is a little too great for its use for sound projection or television as required by present-day standards.

The discovery by Smith, in 1873, of



Selenium rectifiers are extensively used in TV sets

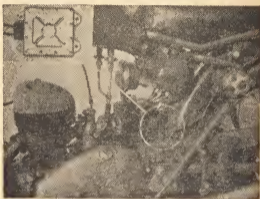
the effect of light on the resistance of selenium made all the above uses possible but, moreover, stimulated the extraction of this comparatively rare element from lead chamber deposits and from the sludge found in the electrolytic baths used in the refining of copper. There is no mineral containing sufficient selenium to be regarded primarily as a source of this metal. All the selenium of commerce is obtained as a by-product in processes using sulphur or metallic sulphides for some other purpose. The increase in the availability of the metal led to widespread research into its properties and consequent utilisation in many fields.

Alternating current is converted to direct current, that is to say, it is rectified by a device which will let current flow through it in one direction only. Iron plates coated with a surface of selenium about one five hundredth of an inch thick which separates it from a second plate of soft metal serves this purpose and selenium plate rectifiers are widely used in industry today.

Selenium has solved another problem of modern times, that is, the production of an adequately red glass for strongly illuminated danger signals. Such glass can be produced with less than three per cent. selenium content. Some of the more attractive modern glass tableware in varying shades of red is produced with much less selenium. In the production of clear white glass, pure white sand is normally necessary and it is not widespread on the earth. Near white sand contains traces of iron which tend to give glass a greenish tinge. It has been found possible to correct this fault by the inclusion in the

glass of a very small trace indeed of selenium.

Besides the six more or less permanent isotopes in naturally occurring selenium, several others have been produced artificially. These are radioactive with short half-life periods. Practical application of artificial radioactivity is still very much in its infancy, but it is certain that the part played by selenium in the chemistry of living



This Westalite rectifier trickle-charges a motor cycle battery

things will make possible the use of artificially radio-active isotopes of selenium in the investigation of many of the problems of bio-chemistry.

When rubber comes from the tree it is, of course, too soft for many of the purposes which rubber has to serve and so it needs to be vulcanised. Sulphur does the trick. The metal selenium likes to pretend to be the non-metal sulphur. It does so very happily when used instead of sulphur as a vulcaniser. The process takes less time than with sulphur, the rubber is stronger and lasts longer, makes, among other things, better brake linings, better tyres and better rubber heels.

In metallurgy, selenium has a wide

range of utilisation. A coating of red selenium renders alloys of magnesium capable of standing up to long immersion in sea water without corrosion. A small trace of selenium in stainless and other steels increases their workability and speeds up the rate at which they can be machined. Copper, which contains a trace of selenium, is similarly much more easily machined than are other alloys of copper.

Although its photo-electric properties are a little on the slow side, for television transmission, the selenium finds a place in television as an ingredient in the luminescent coatings of television screens.

Selenium, in its abundance in the earth, is comparable with gold and, as has been pointed out, only traces of it are found anywhere. Nevertheless, the annual production has probably doubled twice during the last twenty years, which indicates its steadily increasing usefulness. Fortunately, in all its uses, a very small quantity goes a long way. It is used in the pure state in a photo-electric cell but only a small piece is necessary. Only a very thin coating is needed for the rectifier. In its other uses small quantities confer their benefits on large amounts of other things.

Plants take selenium out of the soil in quantities so small as to appear almost meaningless if expressed in terms of figures.

However, given extra selenium in the soil, some plants will take in rather more than the normal amount, and by so doing render themselves poisonous to insects which usually prey upon them. Compounds of selenium have, in fact, been used as insecticides by such agency. There are certain plants known as selenophiles which absorb selenium rather more readily than do most plants. In this group are found onions and mustard. Now selenium likes to play the part of sulphur, and sulphur in organic compounds tends to be decidedly smelly. The most notorious stinkers in chemistry are the sulphur containing mercaptans. It

is an intriguing thought that, although selenium was not discovered by Berzelius until 1817, it has been making its presence felt through the ages by its own particular contribution to the smell of onion broth and the tang of mustard.

The Human Centrifuge

Continued from page 7

ing up and sitting down of men under 10g. They also picture the subjects putting on parachute harness and finding out the maximum amount of g at which a pilot can operate his ejection seat.

To the scientist with his eyes on the stars, these experimental conditions offer much more exciting prospects. Just what will happen when the first man-carrying ship blasts off? Where should the controls be sited so as to allow maximum effect with minimum effort? What about that tube lining refractory—will it stand up to the take-off stress—and if not, why not? These are some of the questions that this new centrifuge will go a long way in answering.

This new milestone in aviation medicine in this country was the product of much work and research. Plans were finalised in 1947, and the total cost of the machine is about £350,000.

A typical test run consists of selecting the required accelerations, gravities and times, and fitting a cam which, rotating, will govern the entire procedure. The team are interconnected by microphone and loudspeaker—but the three controlling the subject may talk together without his hearing—a nice psychological touch. And, should there be any emergency, the arm may be brought to rest by cutting off the current at the touch of a button and using the mechanical brakes.

But there is nothing now, in this field of aviation medicine leading to the space medicine to come, to put on the brakes of progress. Truly, we are one great step nearer the conquest of space.

Tools for Tomorrow

BY KENNETH JOHNS

SHOULD YOU EVER WISH TO buy the latest type of mass spectrometer, priced at £10,000, or the most modern electron microscope for a mere £5,250, or if, like most people interested in the progress of science, you like to wander round looking at all the latest developments in instruments for research laboratories, your Mecca, where the future is on show to the present, is the Physical Society Exhibition.

Held this year at the end of April in the New Horticultural Hall, Westminster, the comprehensive array of prototypes and new production models gave an indication of the main lines of research work today and tomorrow, and the way technicians alter the future by the application of science and research. On entering the hall the names of the great physicists of the past—Newton, Rutherford, Thomson and Young—prof-

ferred a greeting. The aisles in which the 139 stands were arranged had been named after these all-time greats. A fitting connection between those who laid the foundations of our civilisation and the present-day workers who carry on their traditions.

The outstanding fact of the whole exhibition was the preponderance of electronic equipment. Almost two-thirds of the exhibits were either directly connected with electronics or utilised an electronic method of presenting information obtained by the equipment.

Hand-in-hand with electronics, nucleonics has had more of an effect in the world of physics than on the world of the man-in-the-street. This was noticeable in the large number of instruments for the use and analysis of nuclear radiation. Equipment for use in industry was demonstrated, utilising radio-active isotopes

to measure the thickness of thin paper and plastic sheet by beta ray emitters, whilst gamma ray emitters were used in a variety of ways to test metals.

The direct transmission of gamma rays from a cobalt-60 source can measure the thickness of hot steel sheet moving rapidly over rollers. The equipment has a built-in radio-active standard so that every 30 minutes it automatically standardises and checks the sensitivity, the zero, the decay of the source and the presence of contamination.

Where only one side of the metal sheet to be tested can be reached—as in oil pipelines—the ingenuity of modern scientists finds a masterly solution to the problem. The amount of gamma rays back-scattered through 180 degrees from the point of contact can be measured, automatically correcting for the direct radiation, and the same type of control maintained as for flat sheets.

Isotope containers of lead or tungsten were shown in which radio-active sources may be safely carried and

used to irradiate specimens. Unless the source is correctly and adequately shielded, it is impossible to use the handle for carrying. Special lead glasses have been developed which enable radio-active processes to be viewed directly with the operator shielded in perfect safety. The normal darkening of lead glass that occurs when it is exposed to high energy radiation can be almost eliminated by incorporating cerium oxide in the glass.

Isotopes are now being used to prevent static electricity causing ether explosions in operating theatres. Air is blown over a radio-active source so that the air becomes ionised and grounds the static charge.

Instruments for the measurement of nuclear radiation were well to the fore in the exhibition. Geiger-Muller tubes have been produced with an outside diameter of only .08 inches. These have incredibly thin walls and are used as brain probes, being capable of insertion into the brain—a truly amazing miracle of science.

All types of radiac instruments—the term comes from the initials of Radiation Detection, Identification and Computation—for civil defence purposes were on show, and many are in production. Prices of the cheaper models begin at about £25. They include dosimeters, indicating the total amount of radiation received, and rate-meters, showing the amount of radiation actually being received. Although a first impression gives the picture of these instruments in use in the event of nuclear warfare and the perils of fall-out, they are proving invaluable today with the great amount of research being carried out with radio-isotopes—they help to prevent the scientists being carried out!

There was a marked emphasis on scintillation counters, a comparatively new method of monitoring nuclear radiation; although the basis of it was used in the older spinthariscopes. The modern counterpart uses a phosphor that emits light when struck by high energy radiation, and this light is picked up and

amplified by a photomultiplier tube so that the radiation can be counted.

Using a crystal phosphor in the instrument enables radiation to be pinned down to the exact spot in the body where it resides. An example of this is cancer of the Thyroid, where only Thyroid tissue absorbs the radio-active isotope of iodine.

Phosphors have now been incorporated in plastics, so that a liquid source can be placed in a tube of such a plastic and the total radiation measured in all directions at once by measuring the total amount of light emitted using a wide-angle photomultiplier tube.

Metals that once were obtained as very impure specimens as scientific curiosities, are now being made available in relatively large quantities. These find favour in the new corrosive conditions in high speed jet planes and nuclear piles, where their peculiar properties find special uses. On exhibition and available now for industry were, among others, zirconium, niobium, tantalum and molybdenum.

Very pure specimens of difficult-to-obtain metals, such as rhenium, germanium and silicon, were shown in large quantities—that is, a couple of pounds weight of each.

It is indicative of present trends that almost every scientist has to be a practical electronics engineer to understand and service the modern tools of his particular profession. This trend has been increasing, for better or worse, during the past decade, and tends to increase specialisation in particular branches of a single science. Where once a chemist armed with a few test tubes, beakers, a bunsen burner and glass tubing was well equipped, today he has to be ready to handle ultra-violet, infra-red, X-ray, polarographic and mass spectrometric methods of analysis, and to understand the methods and their limitations. The overall impression of the exhibition was one of understanding of this need and an urgent desire to explore new fields to find answers to ever-fresh problems.

With these new methods there is a saving of time, and

time is very much money where a thousand a year chemist is employed—the only obstacle is the loss of simplicity. The present trend in electronics in the sphere of miniaturisation, which provides one solution, was evident when one stand showed the seven smallest electronic components in the world.

These are transformers a quarter of an inch thick, magnetic amplifiers one millimetre thick, tiny torque motors, miniature volume controls and switches, fine insulated wires only .014 inches in diameter, four-way plugs .036 inches in diameter and minute high tension generators. Elsewhere, there was on show the thinnest tube in the world with an outside diameter of .00175 inches. The tube needed a magnifying glass to be seen.

A number of applications of transistors and semiconductors were demonstrated, including a completely separate telephone handset. This picked up dialling tone and speech from a unit in the telephone base and, providing the handset was within several yards

of the unit, acted as a normal telephone transceiver, even though no wires connected it to the system. This device of tomorrow is already in production. Its attractions to the busy magnate are obvious, and its elimination of that infuriatingly twisted telephone cord will bring blessings upon its inventors.

Transistors were in use in a refrigerator freezing water. An electric current is passed through a junction between p and n-type semiconductors to remove heat by a reversal of the effect by which a heated junction generates electricity.

To handle the very high temperatures now being used to melt the newer metals, manufacturers were showing details of crucibles of such refractory materials as pure tantalum carbide, titanium carbide, tungsten carbide and zirconium carbide. These are now being produced by powder methods.

Many publishers exhibited the latest books on scientific topics, including the large, expensive specialised tomes so lavishly produced that amazed the layman.

There were being demonstrated plenty of uses for ultrasonics, including flaw detectors for metal castings, high-powered apparatus for ultrasonically treating liquids, and ultrasonic delay lines to act as the memory of digital computers. A fascinating example of the progress being made by science was an ultrasonic method for mapping the interior of the body and brain so that the positions of any abnormalities, such as cancer, may be accurately measured.

The tendency to make instruments almost fully automatic was ever present throughout the exhibition, being particularly evident in the different types of automatic blood cell counters. This removes much of the tediousness in standard analysis of large numbers of blood samples. This equipment would be indispensable in the event of nuclear warfare, when millions of people would be affected by radiation and the only sure way of quickly finding the degree of injury is by blood counts. One example shown counted an average of

200 cells a second. Other automatic equipment on show included balances and distillation and titration apparatus.

Everywhere there were oscilloscopes by the dozen being used to indicate information in an easily understood manner. An X-ray microscope has been developed at the Cavendish Laboratory, Cambridge, which enables the internal structure of tiny biological and metallurgical specimens to be seen.

Digital and analogue computers were shown in operation, together with all manner of equipment to go with them, including the new magnetic memory drums that can store 400,000 pieces of information. Also shown was an electric typewriter playing back the programming tape of a computer, and a method by which an analogue computer can be interconnected with a digital computer.

Synthetic sapphire crystals, about three inches by one and a half inches, were shown quite matter-of-factly by one firm.

Many types of acceleration gauges were displayed. One

had a reading of up to 20,000 g. For the sake of the crews, one hopes that this model is not intended for use aboard spaceships!

The whole exhibition was a vast wonderland of science, where the impossible was made to come true. There were over 1,000 exhibits, and the large number of visitors, many of them between 20 and 30 years old, clustered around every stand showed that the spirit of science has not been lost, and that one of man's greatest assets is still his insatiable curiosity.

Once the unknowable has been understood there is always a new line of research to be carried out. The advancing frontiers of knowledge were quite plainly shown by this exhibition to be a vital reality in our present life. A dynamic force that promises a glorious future.

These advancing frontiers are like an expanding sphere of light in an infinity of darkness. The ever-increasing surface of the sphere symbolises man's attempt to hold the Universe in his mind and subdue it to his needs.

Roll Bonding—and Blowing

WHEN SCIENTIFIC RESEARCH produces a radically new technique to meet the specific requirements of an industry, there is a strong possibility that the new system can be applied to other industries and directly benefit millions more people—people who have no knowledge at all of the back-room scientists who have worked to this end.

Evaporator plates in refrigerators, which are expensive to produce and, by

reason of their construction, not as efficient as they could be, were the subject of a mass experiment recently. Two hundred and fifty thousand refrigerators were sold containing a revolutionary new type of evaporator plate during the past eighteen months. Such was the confidence of the manufacturers in the process—a confidence fully justified—that they have now laid down a new multi-million dollar plant to put the new process on a mass production basis for other industries.

The company, the Olin Mathieson Chemical Corporation, specialising in the fabrication and finishing of all types of metal work, believe that the new process has applications in countless industries concerned with heat exchange. The new process, an application of the old art of roll bonding, makes it possible to manufacture any pattern of tubing no matter how intricate within a single homogeneous sheet of metal. Clumsy soldering and heat retention in the wrong places is entirely done away with—the new process makes it possible for the conductor to function at 100% efficiency.

Any pattern that can be drawn on a piece of paper may be reproduced as tubing within a sheet of metal. Six sheets may be bonded at one time and complicated parallel or multiple tubes, running at



The pattern that is applied in stop-weld ink.

right angles in two or more layers, may be made with a startling simplicity in comparison with current methods of patterned-tube construction.

Two sheets of aluminium or copper are cut to size and cleaned. The pattern that will become tubing and other passages is applied to one sheet by the silk screen process. Instead of ink, a stop-weld material is applied. This prevents the metal from bonding where the pattern is printed. The two sheets are placed face to face, spot welded to hold in position and then hot rolled. The first hot rolling of the sandwich

produces a complete bond. Subsequent cold rollings produce the correct thickness, and also elongate the sandwich, which means that careful calculations of the original pattern have to be made so that this enlargement brings the pattern to its correct proportions.

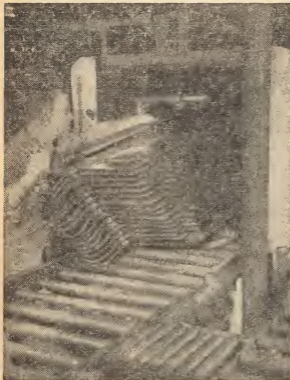
The fused material is then annealed. Everything bonds except the area where the stop-weld pattern has been applied.

One end of the plate is trimmed, exposing the lead-in end of the pattern. A needle, similar to that used to inflate a football, is inserted into the bared pattern end.

The bonded plate is placed between two heavy platens, flat plates of metal, in a hydraulic press. Hydraulic pressure is then applied through the hose to the needle to inflate the non-welded design. Areas where the stop-welding has been carried out become passageways. These passages are an integral part of the material.

This is the important feature of the process. Tests have shown conclusively that under breaking strains the tube will rupture first under the pressure, never the bond.

The passageways are cleaned and flushed out to remove the stop-weld. The



Flushing of evaporator plates

result is a labyrinth of passageways which correspond exactly to the blueprint specifications of the pattern.

There's a sort of fairy tale magic of science about this. A solid sheet of metal, honeycombed with tunnels, produced quite easily, and yet, given to a person who was not aware of that process, producing consternation over tooling costs and production difficulties. Blowing up a sheet of copper like a rubber mattress!

And, also, there's magic in its uses.

The roof of a house, built from roll-bonded sheets containing water, would accept solar heat, heat the water and pass it through controlled roll-bonded sheet walls.

Decentralised heating! Solar power can be utilised to heat houses by this means, Massachusetts Institute of Technology says that the process brings this dream closer to reality. The three problems in solar heating—trapping the warmth, storing it and conducting it through the house—are far more easily handled by the roll-bonded sheet process than any other.

The entire side of a house could easily be a series of vertical roll-bonded sheets, large air spaces or small passageways within the

metal serving as insulators, heating conductors, wiring conduits or for the carrying of cooling agents.

Leading aircraft manufacturers are testing the roll bond for use in cooling aerofoils, cockpits and turrets at supersonic speeds. Entire wings may be made from roll-bonded sheets in which intricate tubing conducts cooling agents with no chance of leakage, with greater saving in weight and with increased strength of the airfoil.

What the roll-bond system has done

Continued on page 71



Metallograph showing separation of stop-weld (below) and fusing of bond (above)

Are you colour-conscious?

by *TRIONA LAW*

HAVE YOU NOTICED THIS seeming sudden craze for colour? With the last few years colour has begun to have a greater influence on our lives than it has within living memory. Manufacturers and advertisers have realised its possibilities—the general public have succumbed to its fascination, and even local councils have begun to use it with a gayer abandon on the outside of newly-built houses. You can now buy a car in a variety of shades; the former dull factory blazes with yellow and blue; the china shops attract with their jaspers, rose and golds; the contemporary furniture shop sets its light furniture against a background of brilliance, and even the advertisements have blazed forth in fluorescent paint. Why should this desire have overcome a coun-

try noted for its conservatism in decoration, notorious for its chocolate-and-bottle-green houses?

It is, in fact, no sudden craze but a gradual build-up of desire for brilliance, a natural desire that was suppressed because of a belief that colour was blatant and lacking in good taste.

Since the eighteenth century colour in clothes and decoration receded until it reached its nadir during the last war, in the drabness of camouflage and uniformity. At that time, the dullness in houses, china, machinery of all sorts was essential to the "war effort." Decoration of any form meant more employees were needed, and it also costs more to finish a product in colour. The legacy of the Victorian age, too, was present in the chocolate-

coloured walls of kitchens and halls—the fallacious belief that such colours wouldn't "show the dirt."

Then the war ended, but relaxation of restrictions were slow, and, in many cases, only partial. The former employees who knew how to decorate china, for example, were spread over the country, still under Government service and unable to return to the old homes—which in many cases, anyway, were only piles of rubble from sneak raids. The Ministry of Labour still held (as it does today) the power to prevent anyone taking a post except that to which the employee was directed in order to help the "export drive," which was the "incentive" that replaced "war effort."

WHITE CHINA

In spite of this, the people of Britain were sick of white china, of black cars and bicycles, of dull drab advertisements, of clothes that resembled uniforms. The firms that made paints developed

special paints that people could use to decorate utility china. The great "Do-it-yourself" movement started because people were unable to buy—even if they had the money—exactly what they wanted. Hand-painted china was, perhaps, the first item on which people expressed their craving for colour. Even though the factories could not obtain the experts in sufficient number to decorate china for home markets, the ordinary person was determined to have decorated china. And if he couldn't buy it, his own first crude attempts at decorating gave him the satisfaction of achievement as well as his desire for colour.

Slowly restrictions were relaxed still further, until today the grand revolt is in full swing. The white tea set is in the minority, the coloured pottery instead graces the windows of every china-shop in town. And colour has become an essential to the everyday life of the everyday person.

This revolt has been given great help by the magazines, in which articles on decoration in the home appear with almost monotonous regularity. The Festival of Britain, designed by men inspired by a dream of the future, and the Coronation, with its feast of crimson, purple and gold, gave the final seal of approval. The country went colour mad.

APPETITE

And what effect does colour have on people? It is a basic factor of our lives—its influence ranges from food to relaxation. How insipid and unsavoury seems a white plate covered with boiled potatoes, with cauliflower, white sauce and a slice of boiled mutton! How appetising seems the same boiled mutton with caper sauce, carrots and potatoes covered with a rich brown gravy! The colour is everything. The attraction of food lies in the ability of the cook to present it with a mixture of colours. Here comes help

with the coloured china and pottery. Here, too, the folk-weave or seersucker cloths, brilliant in scarlet and green, all working to one purpose—to give one an appetite.

The drab kitchens of the old days were depressing to the women condemned to spending the larger part of their lives in them. Now the white colour-edged furniture is cheerful, and it is possible to obtain kitchen equipment in many attractive pastel shades. Even the refrigerator can be bought to match the colour scheme.

In schools, children seem to learn better when their lessons are taught with the aid of colour. Children never live in the world of black, white and grey. To them colour is more essential than it is to adults. The old history books with their lithographs and line drawings have given way to the coloured picture, the cartoon film and the painted plaster model. The graphs in their arithmetic lessons are gaily completed in yellows,

reds and greens, while the dullest geography lesson seems pleasant when there are coloured relief maps with which to learn.

INDUSTRIAL

A good example of the child's desire for colour being more important than anything was reported in the papers a short while ago. A group of children were being tested to see what they would eat if left to their own choice. Taste did not count—colour ruled everything. What matter to them that green peas were not proper corollary to custard? They looked more attractive that way, even if the taste was a little peculiar, and so the children chose their food by colour.

The factory, too, has discovered that colour may mean less absenteeism and even less accidents. The old idea of marking all dangerous items red is dying—now these parts of machines are marked in a yellow that screams "Do not touch me!" The electrical

connections with their silent death are painted blue as a warning. Trafficways are marked each with their individual colour, and the old grey plaster walls have given way to pastel shades that are more restful to the eyes and, therefore, less depressing. The employee who, because formerly bored to death by lack of colour, was often absent, now works more happily in surroundings that give a zest to his work.

STAGE

Colour can be as effective as alcohol as an uninhibitor of the emotions if used in just the right way. A pleasantly light-headed dizziness can be imposed when the right colours are used in just the correct proportions. But feelings of anger, depression and other emotions can be stirred just as easily by the use of specific colours in the exact proportions necessary.

The stage has long known this effect of colours, and the

designers of decor for ballet and opera have made full use of it. To see a black-and-white film nowadays is an unusual experience—the pleasure of watching a film increases if it is coloured, and the demand for colour-TV will eventually over-rule the B.B.C.'s decision to continue monochrome transmission. We do not see in black and white, therefore, it is to us an unnatural experience to watch things that should be coloured, presented as a series of greys. The B.B.C. state that they will not hasten the use of colour on TV because it appeals only to the emotions. Of course it appeals to the emotions! Are we then nothing but machines which need no emotions? Our whole lives are ruled by emotions from our first exultant breath to the last regret at death. If used, then, in the proper manner, colour on TV could cause the viewer to feel the emotion appropriate to the action on the screen.

ESSENTIAL

All of which makes one wonder—will TV politics in the future be ruled by colour, so that one party, wishing to induce hatred of another, will use a combination of black and scarlet as its spokesman thunders against the opposing party? And will those who wish the electorate to believe that their way is a life of milk and honey use pastel shades as mellifluous voices caress their speeches?

Colour is an essential to life, or we should be living in a world where dark is black, light is white, and anything in between is an indeterminate grey. The public is beginning to realise this, and for this reason alone, maybe not fully consciously determined, colour is playing a much larger part in the lives of most of us, and only the colour-blind miss the enjoyment the proper use of colour can give to those who will use it correctly.

By examining the past we can predict

Man's Face in the Future

by FRANK WILSON, B.Sc.

PARENTS HAVE A WAY OF LOOKING at their children as babies and wondering what their appearance will be when they grow up. Physical anthropologists do much the same thing with the human race—only rather more scientifically! By studying the face and skull form of present and past races, it is possible to predict what man will probably look like in his adulthood. After all, the human race is at the most only about a million years old—a mere split second of eternity.

The earliest creature that appears to be on the direct line of man's descent is called *Proconsul*. This was a rather chimpanzee-like animal that had its stamping grounds in the heat of Central Africa during the Early Miocene period, about twenty million years ago. If we look at his skull, we find that it occupies a sort of halfway position between modern apes and primitive man. His forehead slopes backwards alarmingly and his jaw juts forth in what must have been a most ferocious manner. An uncouth fellow, with no pretensions whatsoever to anything like intelligence!

Though physical anthropologists employ a whole lot of skull measurements in their work, we here shall restrict ourselves to two: 1, the angle formed by the lines that run (a) from the brow

ridge to the front of the upper jaw, (b) from the back angle of the lower jaw to the back of the braincase; 2, the prominence of the brow ridge. Looking at *Pronconsul* from these points of view, we find that the angle is not really an angle at all; the lines are very nearly parallel. And the brow ridge is practically absent—at least, we'd have to search carefully to find it.

We have no space here to trace out



PROCONSUL



PEKING MAN



NEANDERTAL



ROMAGNON



MODERN MAN



FUTURE MAN?

all the links in man's ascent. We shall have to make do with the highlights. So we'll jump the Australian near-men and come right up to Peking man, scientifically called *Sinanthropus*. He flourished about half a million years ago, probably in a very primitive form of society. He was a bit of a brute to look at, hairy all over and distinctly ape-like. The course of evolution had given him highly prominent brow ridges—like the modern apes—and had got to work on that angle, changing it from parallel lines to an angle of about 38°. We begin to see the pattern emerging. The forehead slope was lessening and the head as a whole was becoming taller.

This, after all, is the kind of thing you would expect in the evolution of a creature that had developed in trees and then come down to the ground in an upright posture. The earliest primates had long heads, rather like the heads of dogs and rats today. But when a creature stands upright a long head might throw him off balance. So it becomes shortened. At the same time, it needs to get bigger, because the brain is developing fast and must have housing. Thus the skull, instead of getting longer grows higher.

About a hundred thousand years ago there was a centre of primitive culture in the place that we now call Dusseldorf, Germany, specifically, the Neanderthal Valley. The men who existed at this time showed a much less prominent brow ridge. Indeed, apart from their hairiness and loping gait, one might mistake them for "ordinary" men. The angle we are concerned with had now been increased to 50° and the forehead slope was still more diminished. We have now reached the era of true men, though they probably behaved in as uncivilised a fashion as we do today, but with more excuse!

As time wore on, man's life became more and more complex, more and more removed from that of a wild animal. By about 80,000 years ago he had even started painting on the walls of his dwellings the way modern

children do whenever they get the chance. This was the period of Cro-Magnon man, so named after the place in Southern France where his remains were discovered. He is not very different in skull form from his Neanderthal predecessors. The angle is much the same, the brow ridge is a little less evident. The important difference is that the front of the skull, the face, has come to lie more or less in a plane at right angles to the horizontal. The face is flat and upright.

Homo sapiens—about the one Latin name that everybody knows—probably came into existence about 70,000 years ago. To all intents and purposes he was identical with the men walking around today—at least as far as his skull form went. We are now in the era of modern man. The angle has been increased to about 60°, the brow ridge has completely disappeared, and the face is absolutely flat and upright. Another trend that we can trace through the types we have mentioned is that the length of the lower jaw decreases as we come up to the present. *Proconsul* had a very long one, Neanderthal man had a medium one, modern man has a short one.

What, then, of the future? Let it not be argued that we suggest any detectable changes will appear before about twenty or thirty thousand years have passed. Evolution is a slow business compared with the bustle of our everyday lives. But by about that time—about the year 25,000—when our bones are being dug up and gawped at, man will probably look something like the figure shown. We've tried not to exaggerate. We suggest that the angle will have increased to about 75°, that the lower jaw will be extremely short, the vault of the skull very lofty, and that the plane of the face will begin to slope *forwards* as the forehead swells. We've shown some teeth, though we're doubtful if these will be retained into adulthood at that date.

All in all, your great, great, great, great, great, great grandson will be a most peculiar looking chap!

Where religion is concerned—

Scientists are People

by W. W. BYFORD, B.Sc.

“GOD,” SAID ABRAHAM Lincoln, “must love the common people. He made so many of them.”

Let us accept for the moment the assumption that there is a God and that there are folk who can be classed as the common people. Let us also accept Lincoln's premises that God loves the common people. Then, I think, we must concede that part of God's love for these common people is manifested by His making some most uncommon people to care for them and to serve them. Among the uncommon servants I would include such folk as Moses, Alfred the Great, Leonardo da Vinci, Newton, Lord Shaftesbury, Pavlova, Einstein and Danny Kaye.

In point of fact, of course, there is no fence separating any of us from the rest of us. We cannot draw the line between people in any such fashion as terms like “common people” imply. Almost

every one of us is a good servant to the rest of us, whether we doctor the sick, sell across counters, wait at table, drive trains, push pens, make laws, bash squares or help to produce science fiction.

It is unworthy of any of us to consider any man as belonging to a herd in some way less something or other than we are ourselves. Equally dangerous to the good of us all is a tendency to suppose that we are ourselves members of a mob of just ordinary people, quite lacking in something that the celebrated or the top-of-the-ladder type possess. We should not accept in the ultimate any man's statement as authoritative over and above our own beliefs without certain reservations. We must, indeed, to our own selves be true if we are to be true to any man.

The great names of science are those of people, and most of them were people first and scientists second. Without

wanting to make them my prophets, I nevertheless feel that I am prepared to pay some attention to the way in which they reacted to the ordinary problems of living. I am prepared to set a little store by their opinions and their example. A true scientist is essentially honest in his thinking; you can't hoodwink an atom or cross-talk a mathematical problem into telling you the answer.

The last thing I want to do is to run a mission to those who read *Authentic*, but I believe that many of them will share with me an interest in what scientists have thought about the subject of religion. There is still extant a feeling that science and religion are in opposition. Do the beliefs or lack of belief, or more significantly, the lives and habits of scientists support or oppose such an idea?

Scientists are in some respects a little like musicians. Some make music by turning the handle of a street organ, some play musical instruments with mechanical precision, some compose conventional music. These are

not true makers of music. The music makers proper are the people who first design musical instruments, those who compose new musical uses for these instruments and those who sympathetically interpret those compositions. So with scientists we have those who memorise and make use of the truly creative science of genuine scientists. Also there are those who master the mental processes necessary to the inner understanding of the principles of science and by their research work add to the sum total of Man's knowledge. It is with the religious ideas of scientists in this group in mind that it seems to me we may be able to learn from them something other than science.

Let us consider one or two of them in particular.

Michael Faraday had very little schooling as a boy. At an age at which most of us were still at school, he was working in a printing shop. By his own efforts he acquired sufficient knowledge of science to attract the attention of Humphrey Davy, and under his guidance developed into one

of the greatest research scientists of all time. Above all he was a practical scientist. In chemistry and in physics he initiated realms of experimentation that were productive of much benefit to Mankind in their applications to human needs. He was a great teacher and did much to interest the general public in the new understanding of everyday things made possible by his discoveries. He gave admirable lectures to children fully illustrated with astutely devised, but easily understood, experiments. With a candle he was able to give them in a few hours as much knowledge of a variety of scientific principles as many a modern teacher would be pleased to be able to teach in as many months. He was honoured by, and gladly accepted, an invitation to lecture in similar terms to the Great Queen. For doing so he was called to task by, and duly made humble apologies to, his fellow members of a chapel of Plymouth Brethren since, in order to keep his Royal appointment, he had missed a Prayer Night.

Now Faraday was not unaware of the significance of his work, nor of the importance of Royal patronage to its progress, but he quite genuinely was distressed at having allowed such an occasion to take precedence over his prayers with those whom many people would regard as nonentities. Faraday was not a timid man. A noble and influential patron of science saw fit to chide Faraday about a spot of oil soiling his apparatus. The following day the gentleman received as polite a snub as ever man administered in a letter which told him in effect that the spot of oil was the first liquid chlorine ever seen by the eyes of Man. I think I have said enough to indicate what manner of man Michael Faraday was, and it can safely be left to the reader to imagine for himself how much assistance in his thinking and strength of purpose the man derived from the power of prayer which is one of the few, but firm, tenets of the little sect to which he belonged.

Charles Darwin was a man of abounding energy and

considerable enterprise. His account of his voyage round the world on *H.M.S. Beagle* makes this abundantly clear. He saw coral islands above the ocean with his eyes and with his mind, saw them as chimneys stretching upward from the ocean bed on which was the submerged island, on the coastal shelves of which the coral growth began centuries before those islands were submerged. To Darwin's way of thinking he was thus explaining how God created coral islands. He was a God-fearing practising churchman, and his *Origin of Species* was intended to throw a little light on the manner of the creation. Much lesser minds so construed his theories that to them they taught that there was no Creator. The Evolution Theory became an ungodly thing in popular imagination, much as the use of anæsthetics in childbirth was considered ungodly. This last notion the not ungodly Queen Victoria did much to discredit by her precept and example.

The galvanometer, the ammeter and the voltmeter were the instruments which

taught us most of what we know and use in our major applications of electricity. They were named after Galvani, Ampere and Volta, all three of them good Catholics and members of the Third Order of St. Francis. There would seem to be no intellectual barrier between acceptance of the spiritual dogmas and disciplines of Rome and the freedom of conjectural philosophy in the physical world. The Church, which persecuted Galileo for his contribution to astronomy, now runs one of the World's most important observatories staffed by men dedicated to their science and their faith.

It would be possible to add scores of names to the few quoted as examples of minds capable of religious faith and deep natural philosophy. No mention has been made of the fruitfulness of the Jewish faith in the world of science. There have been Buddhists, Moslems and even unethical Shintoists who have contributed to our store of scientific knowledge. There have been many others of no allegiance to any particular creed whose

faith in eternity has influenced their labours. Equally, of course, there have been many professed atheists, agnostics, free-thinkers and call-themselves-what-they-wills whose work has been valuable, but even among these it would be very difficult to find many examples of true scientists whose lives were not governed by personal codes of high integrity. Examples can also be quoted of notable scientists who have turned to religion in the closing years of their lives. It may be that in their senility they became prey to superstitious fears at the prospect of death, or maybe the well-trained disciplined minds, relieved of the stress of pursuit of the natural, in the ease of their declining years, discovered new truths in the supernatural. Certainly these were no prodigal sons weary of sharing husks with the swine, but rather those who had invested their talents well and had the comfort of lives of service.

I have quoted none of our contemporaries as examples of combined merit in science and securely held faiths. It

would, I feel, be taking a liberty to do so, but I think I may be permitted to say that I am aware of such among members of the Established Church, Non-Conformist sects, Catholics, organised Spiritualists, Synagogues and Buddhists, and I think it not unreasonable to suppose that there are many others. It cannot, therefore, be argued that the dual character of sound intellect and belief in the Divine could only flourish in what we sometimes, and probably quite wrongly, suppose to have been the more fervid religious atmosphere of less enlightened ages.

Certainly today it is possible that there are many scientifically well-informed and productive minds in people who, though not within any particular fold or holding wholeheartedly any creed, believe in a beneficent Creator and act accordingly.

If I seem to have been putting anything across in the way of a personal conviction, then I have failed in my intention. If I have shown evidence that natural philosophy and religious thought are

not in opposite camps, then I have succeeded in what I set out to do. I will have shown that, by and large, good scientists are as other good men are. There has been some dissension between eminent scientists as to the question of whether or not sub-atomic phenomena will ever be predictable by mathematics in the sense that Newtonian mathematics can predict the behaviour of matter in bulk. The great Einstein died believing that when we know enough mathematics we shall be able to establish laws which control the things which now seem to us to be ungovernable. Oddly enough some people with the opposite point of view have found in it support for belief in an omnipotent Creator doing as he pleases, but Einstein, when pressed for justification for his belief in the utterly mechanical nature of things, said that it must be so because God would not have made it otherwise.

Scientific truths are often thought of as absolute truths, capable of proof beyond all

possibility of error. This is hardly so. The best we can ever do is show that a truth holds within the limits of all our experiences and within the limits of our physical senses to be aware of our experiences and to interpret them. Every law of science has had to pass through modifications in the light of new experiences. Boyle's Law and the Law of Charles look very different in Van der Waals' equation. Dalton's Atom was a very different thing from that of Bohr, and this is already out of date.

The word God has as many meanings at this moment as there are men who use it, and to every man it has a different meaning every time he falls asleep. It is, however, highly probable that the word God will still be on men's lips long after the atom is an antiquated conception which, like phlogiston, served a useful purpose in its time, but has been succeeded by an altogether different conception of the fabric of which things make themselves or are made by God.



Photo: Ideal Toy Corp.

WONDER TOY

HERE IS AN AMAZING REMOTE-controlled robot, called ROBERT THE ROBOT, who can move in any direction and whose hands move up and down when a child simply cranks the controls. An on and off switch controls lights

on the robot's antenna and in his eyes. A record mechanism permits him to talk. A tool chest in his body contains tools enabling battery replacement. Made of high impact plastic, the robot is 14 inches tall and manufactured by the Ideal Toy Corp. He retails for \$6.00.

The Foundling Dummy

By G. M. FEIGEN

MORLEY HAD BEEN BACK FROM space for about six months when we decided to leave the dummy at his door. When he saw it he probably thought that someone had abandoned a baby. We watched him discover that the foundling was fashioned and dressed as a middle-aged female, and was after all, just a dummy; he picked it up and absently began to manipulate the devices in the back. For most people such a discovery would have been baffling, but Morley was an amateur ventriloquist of considerable talent; he probably decided that one of his friends was being playful.

His technique as a ventriloquist was unusual. He did not, like most Terrans, act as a straight man, and carry on a conversation with the dummy. Instead, he tried to establish the dummy as a distinct personality, and efface himself. He encouraged his audience to question and to taunt the doll, and pay little attention to him. He had a fine repertoire of retorts, yet the replies to questions were instantaneous and, apparently, unrehearsed. He seemed to take to the foundling, and he stopped using his other dummies. I was fascinated by his performances, but neither I nor my fellow AOP's ever lost sight of our mission on Terra.

Morley named the foundling, Rachel, and she soon became a minor celebrity. Her enormous eyes, always moving, and her wise, mischievous face, were frequently noted at local dinner parties. Part of her appeal was the peculiar feeling of the metaphysical which she aroused, a feeling that was both stimulating and frightening. Morley was quite dextrous with her strings and

pole, and he had developed his conditioned reflexes so that her mouth, eyes and head moved with fine coordination, and this, together with his apparent success in subduing his own rather tempestuous personality, made for a remarkable rapport which was highly entertaining. Every now and then I, too, thought of Rachel as a real live Terran.

No one on Terra seemed to know where in space Morley had spent those thirteen months. It was generally known that after his return he seemed to live at a higher rate than a geologist's salary would ordinarily permit. For a while we saw him at many night clubs, seated with some insipid yellow-haired female, drinking enough alcohol to make him incoherent, but never saying anything that was useful to us. After a while he began to live more quietly. We were on Terra, watching him, because we wished to find out what he had done out in space; we knew where he had been.

It was at one of his performances before the advent of Rachel that a suggestion for the ethical solution of the problem was accidentally offered. Morley was using a male dummy; he seemed lost and withdrawn, and did not smile, even at the dummy's better quips. Later, when the party subsided into the usual little groups, I listened to a psychiatrist discussing Morely's act and ventriloquism in general. The doctor indicated that ventriloquy allows the human member of the partnership a certain healthy schizophrenia which permits him to act out certain behaviour patterns by way of the dummy—patterns that would be totally inhibited in ordinary relationships. But in the case of Morley, the doctor thought that a deeper, more complicated psychiatric situation seemed to exist. Morley was, without realising it, discharging his unconscious through his dummy. The particular technique of self-effacement, the doll carrying on conversations with members of the audience, was an effective device to discharge repressed

material. He concluded by speculating that it would be most interesting to watch Morley working with a female dummy. A closer relationship would probably exist, and more significant material might come out—his love life, his feelings about women, etc. I did not hear the rest.

Perhaps we of the Alternate Outer Planet have an exaggerated sense of justice. We must be certain before we punish; this is an unassailable principle. Just over a year before, one of our metallurgists, 1st class, female, had been on the verge of an important discovery. She had been last seen with the Voyager from Terra; she had laughed with him, and then had fallen in love. She was found dead at the foot of a dismal crag on the Saturn side, and the Voyager had disappeared. The Voyager was Morley. We were sent to Terra to watch him. His new prosperity, the period of dissipation, and his increased tension were insufficient to condemn a man to the living death which is our penalty for murder. We needed a definite clue to confirm our suspicion that he had stolen the discovery and committed murder. We have ways of being unobtrusive; we watched him continuously; he was stalked, trailed, overheard and observed even during his disturbed sleep. We had nothing definite until the psychiatrist gave me the idea. We furnished Morley with the foundling dummy.

It finally happened when Morley was entertaining at a large dinner party. The guests had gathered in a large, comfortable social hall, and were seated in a semi-circular group. The host announced Morley, and at once there was an excited buzz of sound. Rachel was lifted from a case and before her ruffles were straightened out, he had her eyes moving and her head turning to start the remarkable illusion before a word was spoken. The act, once begun, was fascinating as usual. Rachel was being teased and questioned, and was deftly turning the

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Private Satellite

by JONATHAN BURKE

THEY WERE SITTING BE-side one of the small, concealed buildings from within which hummed a generator. It was possible that Sandra had chosen the spot to emphasise the unreality of everything on Orpheus.

"It's tragic," said Jacob.

"Until last night I did not know how tragic. Until I heard you play, I did not really understand how great Sudermark must have been."

The irony of it was overpowering. Here, where the world was of Sudermark's own contriving and where it had been popularly assumed he would be writing imperishable masterpieces, the full quality of his music had not been appreciated.

And there had been no masterpieces.

Nothing.

Jacob said: "It's incredible. I don't see yet what can have happened to him. He was at the height of his powers. In these conditions, with everything arranged to suit him, I would have thought . . ." He let the sentence tail away into an indecisive gesture.

"The fault is my mother's," said Sandra, quietly.

The Eye was not watching; the ears of the universe could not listen to this. Jacob said, bluntly: "She has taken up too much of his time? His passion for her has been the death of his art?"

Very slowly, Sandra shook her head. "She has killed him, but not in that way. She has killed him by the selfishness and smallness of her mind. This is her world, not his. They are both weary of one

another, and completely bored by Orpheus. But they will never leave. My mother would not let Sudermark go because it would be such a blow to her pride. And he would not slip away, secretly, of his own accord."

"He is not that sort of man," Jacob agreed.

"In the same way she has corrupted Karel. She has sapped his energy by surrounding him with luxury. He is bored, but he has no ability to stand up and declare his independence. She has made sure that the young women of the village, the daughters of our workmen and musicians and technicians, are brought up to be amenable to him. You saw his latest flame. She will probably be the lasting one—she's the prettiest of the four girls of her age. He may fret and talk a great deal about wanting room to stretch his arms—to see the planets and lead a really interesting life—but he will stay here."

Jacob sat looking down the

grassy slope. Behind him the gentle hum of the generators pulsed through the ground, driving life through the veins of Orpheus.

He said speculatively: "And what if something went wrong? If the power failed, and the grass ceased to grow?"

She had a faint smile on her lips. "I've often wondered about that. Often I've had dreams in which the trees crumple, the stream stops running, and there are only ghosts left on Orpheus. The vision is terrifying—but, somehow, I am not terrified. I feel a great sense of release. Somewhere there is reality, and now at last I'm going to find it . . . and then I wake up, and find that the trees and the grass and the stream are still in working order."

She stared out, unseeingly, across the fields, seeing out into something far beyond.

Jacob said: "Will you come away with me when I go?"

She sat quite still. Brittle laughter splintered somewhere down in the trees.

"What I have to offer is very little," he said. "In fact"—he was fumbling in his pocket—"from now on I am liable to be extremely poor."

He took out the small fragment, the Eye, and it lay in his palm like any small metal part of some machine. Sandra glanced at it, not understanding, and said nothing. Jacob got up and walked to the stream where it came curling in towards them. He made sure that the Eye was switched off, then dropped it carefully to the bottom of the stream.

The clear water ran over it, and it lay there, a black spot on the white stones. Hatred of it and all the extensions of it out in the interplanetary empire suddenly possessed Jacob. He felt a twinge of fear, imagining the movement of the water turning the switch on and keeping the Eye permanently watchful, focusing the strength of all events on the satellite and sending the pictures out to Mackeson and those who relied on

Mackeson to do their prying for them.

He picked up a stone from the bank and drove it down into the water. It smashed against the Eye, and when the ripples had cleared he could see the tiny parts of the transmitter scattering, trickling down the stones, flicking off through the water like infinitesimal beetles.

Sandra was standing behind him. She said: "What is wrong? What was that?"

"Something foul," he said, straightening up. "One of the more hideous features of the universe outside." He took her hands. "Will you leave this place? I have just thrown away my livelihood. I have ruined myself. And yet I am asking you to come away from this unreal place. I can only promise a bitter life of drudgery for some years, but I am fool enough to offer it—fool enough to believe you may come."

She did not try to draw away. Her candid, level eyes looked into his, and again

there was a suspicion of tears in them.

"I believe I shall come," she said. "I must think about it, and about my mother—and about Sudermark. And I must think about *you* . . . for I hardly know you." She shook her head in wonderment. "Strange . . . it doesn't seem to be true that I hardly know you. I believe I shall come."

His arm was about her now. For a moment they stood there, then began to walk slowly back towards the mound where they had been sitting.

Before they reached it, a man emerged from one of the squat buildings a hundred yards away, and waved to someone out of sight—an urgent, beckoning movement that showed the first sign of haste that Jacob had so far observed on Orpheus.

"That's strange," murmured Sandra.

The man turned and saw them, and after another wave he came in their direction.

"Good morning, McIver."

"Good morning, miss. Just had a message—first one in years—ship wants to make emergency landing."

"Have you notified the house?"

"Yes, miss."

Automatically the two of them turned towards the house, and as they approached it Sudermark came out. Constanza was behind him, her hands gesticulating fretfully. Her voice carried clearly to Jacob and Sandra.

"Is it wise? You haven't the slightest idea——"

"We can't turn down an urgent appeal like that."

"You don't know what trick they may be up to." Her voice was shrill. Afraid, Jacob wondered, that Sudermark might somehow elude her and be spirited off in this ship that had contacted them?

Sudermark waved her to silence. "Captain Merrick will deal with the matter. We have never turned anyone away." He beckoned the man who had passed on the in-

formation. "Tell the power house to cut down on the sunlight and concentrate on a locking beam. Ask Captain Ransome to be at the emergency reception tube. He will go in and meet the officer in charge. But they are not to be allowed out. The locks are to be strictly supervised."

"That's right," Constanza hurriedly agreed as the man went away. "We don't want to see them at all. Let them have their repairs done, whatever it is, and then go. We don't want them snooping around Orpheus."

They moved towards the great tubes that jutted up against the protective shell. Jacob had not been here since the first day of his arrival. A blanketing haze swirled about the tubes, so that they did not make an incongruous metallic upthrust above the sylvan scene. When the haze was dispersed, as it was now, they overshadowed the trees and the house, and made the landscape of the satellite seem puny, like a

miniature, a child's plaything.

Captain Merrick, in his trim uniform, came hurrying from one of the houses. He was buckling on a gun. The illusion was crumbling before Jacob's eyes. Even now, when he had learned the bitter truth about Sudermark, he could still feel a twitch of dismay as the artificiality of Orpheus was so clearly shown up by those colossal tubes and by the gun that the ship's officer was carrying. It somehow made nonsense of the whole conception. Had Sudermark and Constanza managed to blind themselves to all this? Constanza, perhaps yes; but he uneasily sensed the canker that must be eating into Sudermark, insidiously destroying him, as it had already destroyed his creative abilities. If Sudermark were offered the chance of escape, in this approaching ship, say—what would he do?

There was nothing to be seen as they waited. Only at the last moment was there a smear of braking rockets in

the sky, their harsh brilliance penetrating the opaque shell and the artificial blueness beneath. Then there was a mighty thrumming sound inside the reception tube, followed by silence. Captain Merrick was putting on a space helmet—yet another reminder of the void that surrounded them, and the conditions that an incoming ship had brought. He stepped through a door and was swallowed up in the interior.

Jacob imagined him crossing some short space, a dark vacuum in which reposed the stranger. And then an air-lock would open and he would be admitted.

They waited. A cluster of men and women from the houses by the stream stood murmuring with curiosity. Jacob thought of similar groups he had seen at so many space ports on different planets and their moons—descending from a ship which had carried him far across the solar system to give a series of recitals, he would see those

upturned faces and wonder what brought them always to the landing of a ship. Stella-vision and fast news tapes brought them all the latest news and the most up-to-date programmes. A message could be flashed cheaply from one planet to another in a matter of seconds. Yet some urge drove many people to the space ports to see an actual ship come in—a solid, real ship that had, hours or days before, been on another world they remembered or had perhaps never seen and merely longed to visit. For some of them there would be mail—old-fashioned microletters—and often enough these would mean more than all the fast stellagrams that had ever been sent.

What were these men and women of Orpheus waiting for? The crew of the ship, whatever it was, would not be allowed out to walk about the satellite. Yet they came to stare at the reception tube, waiting for Merrick to emerge, as though the most vital

possible messages had been brought for them.

In all of them a spirit of adventure, of longing, of speculation, was not yet dead.

The door opened suddenly and Merrick came out. He hesitated, then marched across the grass to Sudermark and saluted.

The two of them drew apart from the attentive group, and conferred for a few minutes in low tones. Once Sudermark stiffened, and swung round to stare incredulously at Jacob. Then he looked back at Merrick and shook his head. Merrick went on speaking.

At last Sudermark returned. He came towards the group made up of Constanza, Jacob and Sandra. Karel had not appeared, and the red-haired girl was also missing.

Sudermark was very pale. He stood before Jacob, very tense. When he spoke the words came out flat and hard.

"The newcomers have given Merrick a remarkably ac-

curate description of Orpheus," he said.

Jacob caught his breath. He knew exactly what was meant.

"Not only of Orpheus," Sudermark went on, "but of the people on it. It appears that our doings have been a source of considerable interest to a large audience . . . ever since you arrived here, Jacob." His arms were rigid by his sides. He leaned forward as though to hurl his accusations in Jacob's face. "They say that someone here has been transmitting—that the stellavision audiences of the universe have been watching us for days. For days, Jacob. You must be very proud of your accomplishment." He uttered a mirthless laugh. "In the circumstances there would hardly be any point in confining the travellers to their ship, do you think? There is little they can see now that they have not already seen."

He sat at the piano in the shadowed room. The keyboard gleamed whitely in the

twilight that seemed to be a permanent attribute of this room. This was the only place where he could find refuge. Deserted, unused, empty of all he had expected to find in it . . .

Instinctively his fingers reached towards the keyboard. He struck a chord, resolved it, and began to pick out the theme of Sudermark's Second Piano Concerto—the clamant, resolute opening theme. Here it sounded lost and melancholy.

The door opened suddenly. Jacob sat back with a guilty start.

Karel came in. His grin was as unlikeable as ever. The hint of would-be complicity in it sickened Jacob. He could not stand any joke, any slyness, from this indolent youth.

But all that Karel said was: "I've come to tune the piano."

It sounded ludicrous. But it was apparently true. One of the few jobs that Karel had been taught when he was younger was to tune the

piano, and he still grudgingly carried the work out.

"Though why I bother," he said sourly, "I don't know. It's not as though it's ever used. Nothing but an old relic." His eyes narrowed maliciously. "Like so many other things on this blasted lump of metal," he added.

Jacob went to the window and stood looking out. The unvarying sunlight and the static quality of the landscape, unaffected by seasonal change unless Sudermark or Constanza willed it, weighed down on him. The place was rotten.

But that was no justification for his own treachery.

Karel said: "I'm tired. I'd give anything to get away from here."

"Life outside isn't easy—if you have any conscience, that is."

"I haven't got any conscience," said Karel, cheerfully.

His voice was as hard and self-sufficient and unreal as the landscape itself.

"What do you want to do

with your life?" Jacob asked the question indifferently, merely in order to fill the accusing silence with conversation.

"No idea," said Karel. He plucked a string, and began carefully to adjust the tension. "But I'd like to see more than I'm ever likely to see here." An A twanged and resonated. "What sort of sports," he asked, "do you get out there?"

Jacob had paid little attention to sport. He knew that it was all highly organised and that most of the competitive team games were run for the benefit of the Solar Lottery; apart from that he had only memories of plunging, high-speed contests glimpsed on stellavision screens.

"There's stratopolo," he said, vaguely. "But you need to be in the top grades to be able to afford that. The solo stratocars cost a lot of credits." He thought for a moment. "Swimming," he ventured.

Karel snorted. "Do you think I haven't had enough

swimming in that damned lake down there?"

"This is mainly deep water stuff," said Jacob, apologetically. "The biggest holiday resort on Venus is called Atlantis. After the purification of the oceans and the clearing of the swamps there, they found sunken cave formations that were remarkably like a city. You can stay down there for a couple of weeks."

"And women," said Karel, "not just the same three or four faces all the time. Thousands, millions, a whole galaxy to choose from."

He turned irritably away from the piano, leaving it with its intestines bare. The echoes of his harsh voice vibrated with phantom harmonies among the strings.

The door opened, and Sudermark came in.

"Ah, there you are."

He stopped abruptly as he saw Jacob, and his face hardened. "Wait," he snapped out to someone behind him.

There was a murmur out-

side the door, and then Sandra came in. She looked at Jacob, and he felt suddenly weak. The accusation in Sudermark's eyes was not repeated in her own; there was compassion, and something more besides.

Sudermark said: "I want to speak to you, Karel."

"Speak," said Karel, with an impertinent leer.

"If our guest will go out into the garden. By that window, please, Jacob."

Sandra said: "Jacob knows more about the outside than any of us. It would be much better for him to stay."

"After what he has done?" growled Sudermark.

Jacob said: "Gregor——"

"I have no wish that what we are about to say should be transmitted for the benefit of the entire human race. Please leave."

"The thing I did was wrong," said Jacob. "All I can say is that the Eye—the transmitter—has been destroyed."

"It is easy to say. We would not know. We cannot

tell what you carry, and how you do these things."

"It has been destroyed," Jacob repeated.

Sandra said: "That is what I saw you doing a few hours ago?"

"Yes."

"You may easily have another," said Sudermark.

Jacob said: "I don't deserve trust, but——"

"When you wished to come here, I was afraid. Then I felt a great need to see you. I felt . . . something I cannot explain . . . that perhaps you might help me. Then you came, and once again I was in fear. I was ashamed of my weakness—my worthlessness. You were always my sternest critic. There was never one like you. I felt that you had come to judge me, and I was ashamed because I had done nothing worthy of . . . of the things we believed in. But now I feel proud. I have done nothing; but that is better than doing evil. I have not been corrupted as you have been."

Jacob bowed his head.

Sandra said: "Already I know more about Jacob than you have ever known. He has made a decision. He has renounced evil——"

"When the harm has been done."

Karel chuckled. He had enjoyed the interchange. He looked from one to the other. But there was no more to come. He sighed, and said: "What about our visitors?"

"They are waiting outside this room," said Sudermark. He glared at Jacob, the disillusionment still bleak in his magnificent eyes. "You may as well stay. If you have, indeed, destroyed what you brought with you, you may need their help. You will hardly be welcome back in your own world."

"I have no world," said Jacob.

"We all said that when we were young," said Sudermark. "It was a boast. We were greater than any planet. We belonged to the entire cosmos. And now . . ." He laughed

harshly. "Well, I will bring them in." He swung upon Karel. "They wish to see you."

Karel looked alarmed. "To see me?"

Sudermark went out, and returned with two men in dark brown uniforms which Jacob did not recognise. The leader had iron-grey hair and a weather-beaten countenance. An odd face, Jacob thought—Martian weather did not affect the skin like that, and on Venus the usual result was a slight draining of colour, a pouchiness that made men and women look sallow.

Sudermark's introductions were brief. "This is Major Dunhill. And Lieutenant—ah—Silvio." He snapped out the names of those already in the room who had not yet seen the two newcomers—Jacob and Karel. "Karel Moldau," he said. And repeated it strangely: "Karel, the son of Moldau."

Major Dunhill saluted. Karel watched him warily.

"You may say what you have to say in front of us all," said Sudermark.

The major studied Jacob for a moment.

Jacob said: "I am not returning to Mars. Not yet. And I shall have nothing to say about what happened after the Eye ceased transmitting"

Still there was a hesitation.

Unexpectedly Karel winked at Jacob and said: "If you can't say what you have to say in front of my friend here, don't say it at all." It was not a gesture of friendship—it was adolescent defiance, the sort of deliberate awkwardness that was part of his character.

Major Dunhill gave him an odd glance, then drew himself up and said: "We have come to ask you to return with us to Earth."

"To . . . to Earth? But there isn't anyone . . . I mean—"

"We live on Earth," said Dunhill. "And we need you."

The story was one that Jacob could not take in. He

listened to it as he might have listened to a fable. To those who had lived so long on Orpheus it might seem remarkable enough; but to himself, for so long accustomed to the life of the busy, teeming planets, it was wild fantasy.

Yet he recognised essential truths. Uneasy echoes stirred within him. Impossible as the story was, it was rooted in what he knew to be truth.

It was true, as they said, that here and there throughout the universe there had been murmurings of discontent. The loud proclamations of prosperity did not altogether hide the growing discontent. Men and women throughout the solar system were not as happy as they should have been. They had material prosperity, comfort, and peace; yet they were disturbingly, naggingly aware that something was missing. Something which had been lost, or perhaps never found.

The incoherent grumblings came not from the intellec-

tuals, who might grope for their own sort of reality yet be incapable of translating their yearnings into action—the real dissatisfaction was felt by the ordinary people who, in spite of all the stellavision pressure and the coaxings of propagandists and businessmen, had not quite been levelled out to unprotesting mediocrity. They were inarticulate, but slowly their dissatisfaction spread and was shared.

Among the millions on so many planets and moons were men capable of fitting the pieces together, correlating facts and theories, studying history and formulating plans of action. There were men who feared stagnation. They saw that the present vigour of the human race might easily lose its force. The expansion of the human empire was a purely physical expansion. One day a limit would be reached—there would be a stop to further developments for perhaps a century, perhaps for ever; and then what

would happen? The challenge of the stars would be answered—but once expansion ceased, what consolidation would there be? Where was the inner vitality that would give the whole thing purpose?

As long as you are running a race along a road, you do not waste time thinking of what you will do when the race is over and you have reached the destination. When there is a war on you declare that the time for deciding the purpose of the war is when the war is finished. Put off constructive plans, put off the need for meditation and the formulation of a philosophy, put off the day when movement has ceased and the time has come to take stock.

"When there is work for everyone, and ships are making new discoveries of new worlds every year, there is a tendency not to ask questions," said Major Dunhill. "But some of us began to be troubled a long time ago. We began to ask questions."

Something was missing.

Everything was too easy. Scientific techniques had developed to such a pitch that even adventures in outer space were safer than a sea voyage had been in the days when men lived and struggled on the old Earth.

"Earth," said Dunhill. "That is what we have lost. The loss of tradition." He spoke with the self-consciousness of a man not used to abstract ideas, and shy of the emotional undertones of words. "The loss of . . . of a homeland."

He had spoken with such sudden force that his last syllables seemed to be trapped within the piano, to go on reverberating in a strange discord for a few seconds.

The older people had not forgotten Moldau. Even to the middle-aged he remained as a symbol—a symbol which had once been rejected, but was now coming to have meaning once again. Those had been days of which the human race could be proud—days when its spirit flowered,

when all that was finest predominated. Men had destroyed what they most admired . . . and now were ashamed, beginning too late to understand what they had done.

All this Jacob knew or had sensed. There had never been any open revolt against the vulgar materialism of the Interplanetary Federation, but he had known that there were stirrings of unrest. He himself had shared that nostalgia, but had never imagined that anything could be done about it. The past was dead, the old traditions were dead.

But now the story left the realms he knew, and became fantastic.

An underground movement had started. "Literally underground," said Dunhill, with a grin which they did not for the moment understand. People in high places, sympathetic to the cause, sometimes allied themselves with the planners, or sometimes merely gave assistance here and there.

And people began to travel to Earth.

In ones and twos, or in groups of never more than ten, they left Mars and Venus, left the new, raw cities of the star systems, and headed inwards towards the uninhabited Earth. Ostensibly they were travelling from one planet to another on business, or for a holiday, or emigrating. But papers were forged, landing registers were judiciously altered, and by various devious means small ships slipped away from the main routes and nosed down through the clouds that shrouded the mother planet.

"The early days were hard," said Major Dunhill. "We found Earth as we had been told it would be. Devastated. Dangerously radioactive still in many of the main centres. Its surface had been ravaged by wars. And yet in a way that has been our salvation. Stellavision reception from Earth was appalling. Without an Eye down there to stabilise the vision, it was quite im-

possible to get a clear picture through. The roving eyes of the viewers ceased to bother about Earth long ago, because nothing came through but tiresome splashes all over the screen."

Nevertheless, they had taken no chances. They went underground.

"Troglodytes," said Dunhill, again with a grin.

The great workshops, shelters and homes beneath the major cities of the world were comparatively undamaged. With intensive work it was possible to get many of them back into operation. Shielded from the dangerous radiation above, and even more securely shielded from the ubiquitous Stellavision viewers, men set to work to make a home within the body of their mother world. Later they would emerge. Later, when they were ready.

Jacob interrupted at this point. He said: "Why the need for all this secrecy? Earth has never been declared out of bounds, as it

were. No one has ever hung up a 'trespassers will be prosecuted' notice on it."

Dunhill looked at him coldly. "You have lived out there," he said. "You know what conditions are like. Try to visualise a small group settling on Earth—openly—declaring their intention of starting from scratch and making the planet habitable again. What would happen?"

Jacob shrugged. "The usual things. Stellavision presenting the whole thing to its watchers. News programmes, a lot of jokes about it all, maybe; and perhaps the Federation would want to exercise some supervision over immigration. But, even so, I don't see that you need be alarmed about——"

"The Federation would certainly have wanted to exercise supervision. Over everything. And Earth would be made to fit into the pattern of the other planets. Which would mean that it was not a world at all—not a living, natural world. It would be like all the other planets—

false, artificial." He waved his hand suddenly towards the window, and automatically they turned to look out at the grass and the trees and the blue sky. "Mars and Venus, the moons of Uranus . . . they're all as unreal as this satellite. Men do not belong there. Men can only become real again when they are aware that their homeland is alive and vigorous, in its natural state. And the Federation wouldn't like that."

Jacob was forced to agree with this estimate. But still, he said: "Even so, they could hardly suppress the community on Earth. People still believe the Federation is democratic. Persecution wouldn't be tolerated."

"There would have been no persecution if we had openly announced our plans. Exploitation rather than persecution. Every propagandist technique would have been used to blur the major issues. The big corporations wouldn't want all their best men to go back to Earth, and they would

use every possible means to belittle the project. Health experts would testify that the planet wasn't safe. Stella-vision would deride the whole thing. In order to make absolutely sure, the authorities would be there, 'co-operating' with us—ruining everything we did, getting control, making sure that none of the ideas which drove us back to Earth was allowed to come to fruition. The new Earth would have been choked at birth by innumerable regulations—all so well-meaning on the surface."

"And so," said Sudermark, gravely, "you have built up a secret underground community. And you will continue to live underground?"

"No. We are ready now to emerge. We are strong enough. Our community cannot be wrecked or weakened now."

"You are declaring war?"

"No. The peoples of the Federation would not allow their rulers to make open war. What excuse could they

have? We are ready now to declare our independence and to invite other men and women to join us. The surface of the planet can now be cleared. Work must commence on the fields and the forests. The cities can be rebuilt. But they will not be cities like those on Mars or Venus. We are part of Earth—we know ourselves to be at home, and the traditions of Earth are still living. Until you have been there and worked there you can't possibly know how real and vital it all is."

His conviction rang solemnly through the room. Jacob felt a sudden leap of his heart, as though some forgotten flag had been gloriously unfurled.

Karel licked his lips. He looked very small and very young. He said: "I don't see where I come in. I hope you aren't . . . that is, I don't——"

"You are Moldau's son," said Dunhill. "We need a leader—a name that will rally the enlightened peoples, a

name that will remind them, and bring them back."

"But——"

"Men and women need a focus for their loyalties. They need kings and queens, presidents, ruling families. They need a sense of an unbroken tradition. We have come to ask you to become the first President of the World. -

The skiff moved gently across the placid surface of the lake. Jacob shipped his oars and looked at Sandra, who was trailing a slender hand in the water. The ripples curled away towards the shore.

She said: "What will you do now? Are you coming to Earth?"

He looked at the hazy horizon, so very close to them, and thought of a landscape like this that would go on for hundreds of miles, rolling on over and through the horizon, full of promise.

"It will be a harsh life," he ventured. "For a long time it will be rough and unyielding. I wonder if I'm the

sort of person who can do any good there? There won't be any time for music. Only time for digging and building, for battling against radio-activity and disease."

She studied him curiously. "Are you afraid?"

"I don't know," he said, frankly.

"Music will be important," she said. "You and Sudermark together might——"

"Gregor won't go." He was positive.

"Now that this little world of his has been bared to the eyes of the universe, he can't go on here."

"He won't go to Earth." Jacob was somehow certain of this.

After five minutes, during which they said nothing, he pulled once again on the oars and drove them in towards the bank. They looked up at the house, and as they grounded they saw Sudermark coming out and walking down the slope. His head was bowed, his hands behind his back.

The two of them got out and went to meet him.

Sandra said: "They're still talking to Karel?"

Sudermark looked at her. He seemed puzzled and unsure. He frowned, and the bone appeared to show white through the drawn, transparent skin of his forehead.

"Karel refuses to go," he said.

"Refuses?" Sandra whispered.

Sudermark turned and looked back at the house. The three of them, as though with one accord, began to move towards it.

The sound of voices reached them. They opened a door, and Major Dunhill turned with his arms spread in despair. Karel's eyes were wide, like those of a frightened animal—an animal brought up and looked after so well in a cage that it was unwilling to accept the offer of freedom.

Sandra said: "Karel, this can't be true."

"I'm not going. I don't

want to be a . . . a figurehead."

"You needn't be."

"That's all they want." He was almost sobbing. "A figurehead, to take all the blame, and smirk and posture for the crowds. I don't want it."

There was a baffled expression on the major's face; an expression edged with contempt. He said, slowly and wearily: "We should have known it was an idle dream. Perhaps, after all, it would have served no purpose."

"Why did you come, then? Why did you disturb us?" demanded Sandra.

"We did not know you were still alive—you, Moldau's children. When we saw you on the stellavision screen——"

"Just a moment," Jacob interrupted. "I thought you were renouncing the falsities of the modern universe. It's only just occurred to me—how did you come to be viewing?"

Constanza laughed shrilly, as though this were the most wonderful joke. A hysterical

note came into her voice and drove it up until it cracked.

"We have made it a matter of policy to watch, as well as we could, everything that went on outside. If ever we received a warning that our plans were endangered, or that some of our people had been discovered, it would be through the stellavision. We have one receiver, and one only. It is above ground, in a shielded building. There will never be more than one, and it will be used only as a purveyor of essential information to our government."

Sudermark said: "Already you have the beginnings of dictatorship. Of censorship. You will choose what the rest of the world shall learn of what goes on outside."

"It will not be allowed to get like that."

"Such declarations have been made so nobly, so many times."

There was a silence filled with antagonism. Then the major shrugged and glanced at his lieutenant.

"We may as well go. There is nothing to be done here."

Sandra was standing beside Sudermark. He became aware of her, and glanced sideways. His smile was suddenly wry and whimsical. Jacob saw the real affection that existed between them. Perhaps it had never been openly expressed, but it was there; and his performance of the Sudermark partita—how many hours, days, years ago did it seem?—had strengthened that mutual tie.

She said: "*You* must go. There will be so much you can do on Earth. You will be needed."

Sudermark's smile hardened again, became fixed. In his eyes was a fear almost like that of Karel's. He was glancing at Constanza; and Constanza looked old and worn, haggard with the need to hold on to him even though love had died so long ago.

"No," he said. "It is not for me."

"It's pretty comfortable here," rasped Major Dunhill.

"I suppose I should have realised . . ." He made a point of looking at each one of them, not veiling his contempt now. Then his eyes rested on Sandra. Slowly, tentatively, he said: "There were queens and empresses, once."

The lieutenant said, eagerly: "Women run many of the big combines on Mars. There was a woman president on Venus two years ago."

"No," said Sudermark, stiffening.

Sandra took a deep breath, staring at Dunhill.

"No," said Jacob, also. He reached for her arm, seized it. "You are coming with me. You must. You and I . . ."

Her eyes clouded for a second and then were clear again.

Major Dunhill said: "You are Moldau's daughter. It is clear. Everyone will know you."

"Yes," she said. "I will come to Earth. Not for myself, and not because I want power. I will come because the name

of Moldau must once more be made to mean something."

The young lieutenant's eyes were shining. Jacob glared at him, and then had a wild vision of things dead and forgotten—of men bowing to a queen, of an ordered society in which there was beauty and courtliness. And the dream, the vision, was gone in a flash. The reality would not be like that—it would be hard, grueling work, met with derision and open hostility from the other planets, ending, perhaps, in failure.

But there would be men like these two before him who would not see it like that. There were men and women who would have faith.

Sandra said: "And you, Jacob—what are you going to do?"

"I will come with you," he said.

She shook her head. "It wouldn't be wise. You have said yourself that it won't be your sort of world. You must go back to the place you came from."

"That's out of the question."

"Go back," said Sandra. "Take Sudermark with you, and together you may yet achieve a great deal for music in the new worlds. The old world"—she smiled with a strange pride that somehow set her apart from all of them, that identified her with her dead father and with a tradition that had been slumbering but was not dead—"the old world is not ready for music yet. You were right about that, Jacob. And perhaps it will be better if we start all over again. There will be work songs, because there will be so much work to do. And simple love songs, because the simplicity of love will be real and clean and true again. No, not again . . . everything will be new."

"Disease," cried Jacob. "There'll be disease and misery and heartbreak——"

"As always," she agreed. "And against them there will be courage."

He felt that he had never been close to her at all. The

communion between them had been transitory and half-illusory. She smiled at him now, and said: "Back to your own world, Jacob, where you still have so much to do. And take Sudermark with you."

"I cannot go there, either," said Sudermark.

Constanza looked at him, and then at her son. She saw the expression on their faces, and went pale. In a choked voice, she said: "What have I done?"

The ships were to leave within forty-eight hours. One would head for Earth, the other would take Jacob to the Moon. He deliberately refrained from considering what would happen to him after that.

On the morning after the incredible interview with Major Dunhill, Jacob and Sudermark sat together in the music room. Memories of yesterday's arguments and decisions muttered around them, filling the room with a

vitality and confusion it had not possessed before.

Anger had died in Sudermark. He had forgotten what had brought Jacob here, or else it had ceased to be important to him.

He said: "You can stay here, Jacob. There is no need for you to go back to that—that hell out there."

So many decisions, so many possibilities thrown up for discussion; but in the end each man made the decision he had known all along would have to be made.

"I couldn't stay," said Jacob. "Sandra is right. There's still so much to be done."

"You can't succeed."

"Perhaps not. But one can't just give up. One can't surrender and let the electronic pulse generators triumph over Stradivarius." He sounded more gallant than he felt. "It may be the last battle, and a hopeless one; but the war can't be allowed to go by default."

Sudermark went to the piano. He hesitated, then sat

down and began to play. His fingers were stiff, and he fumbled from lack of practice. But he drew out the great theme from the last movement of his A Major sonata, and it kindled something within him.

"Stay," he said. "It would mean something to me. We could play as we used to play. I could begin to work again."

"Who would hear us?"

"We would play for ourselves. Music is absolute. It doesn't matter if nobody ever hears a note we play or a note I write."

Jacob slumped in his chair, his hands on his knees. He said: "You're wrong. Quite wrong. Art is meaningless without an audience. To write with no hope of a reader, to compose music that will never resonate in the ears of any hearer but oneself . . . that is no good, Gregor."

Sudermark hammered his fist down on the keys, and a sob burst from his throat. "If I could believe you . . . if I had the courage . . . But I refuse to let myself believe

you. I *cannot* leave. I am too old for fighting, for facing the mob. I . . . I have responsibilities."

Jacob nodded. "I quite understand. You have your responsibilities, Gregor, and I have mine. So I shall go back and face the mob, and you will stay here."

"And Karel Moldau," said Sudermark, talking to himself rather than to Jacob, "will stay here, too." He shivered, as though a cold wind had blown in from the garden. "He will stay because she has made him incapable of anything else, just as she has made me . . ." He drew himself up abruptly. "No, I must not say that. It was my fault more than hers."

Jacob wondered. But there was no consolation he could offer.

He, too, shivered.

Sudermark sat motionless for a moment, then swung round and stared at the window.

"It is really cold," he said. "I am not just imagining it."

Jacob had taken the darkness in this room for granted. His first recollection of it was as a dark, cold room; but now he saw that there was something else wrong.

Outside, the garden was steeped in an eerie twilight. The blue had faded from the sky, and it was strangely sullen and muddy. He got up, and Sudermark joined him as he went out into the open.

There was no wind, yet it was cold. The trees did not stir; the blades of grass were frozen into immobility.

And the stream was no longer running.

They advanced on it slowly, almost fearfully. The clear water was still, and the stones at the bottom lay smooth and incisively outlined.

Sudermark said: "The generators have stopped. The pumps are not working."

"You often get breakdowns?" Even as he said it, Jacob sensed that this was no ordinary breakdown.

"There are auxiliaries. It

is impossible that everything should stop."

From the far side of the house they heard Karel shouting, and as they stood there he came hurrying round, followed by Sandra.

"What's gone wrong? It's too quiet."

Sudermark said: "It's all right, Karel." But Jacob knew that it was not all right.

"I'll go and find McIver," said Sandra. "I can't understand how he's let this happen."

"Where is your mother?" asked Sudermark.

Karel shook his head wildly. "I don't know."

People were coming up from the lake. This was no pre-arranged twilight. Their faces were pale in the uncanny gloom.

Sandra said: "McIver . . ."

Suddenly there was light. There were red, leaping flames, and a column of smoke that rose straight up, twisting but unfanned by any breeze.

"Where is Constanza?" cried Sudermark.

They found Constanza lying in the small control room, lying in the hopeless wreckage of the panels from which all the generators and atmospheric stabilisers had been governed. Her face was set hard in death, but there was a smile on her lips—a small, strangely youthful smile that seemed to ask for forgiveness.

Not forgiveness for blowing up the two main generator houses, thought Jacob. Not forgiveness for reducing the delicate wiring and panels to ruin; but forgiveness for what she had done to Sudermark and to her son.

Water from the lake and the unmoving stream at last quenched the fires, but the buildings were gutted. The house itself was dark, and the world around it seemed already dead.

Sudermark uttered no word for several hours. When at last he dragged himself up out of his trance of horror, he said: "Now we can leave."

There was no relief, no

eagerness in his voice. There was only resignation.

"We have got to go now," he said, leaning on Jacob for support. "That is what she meant. That is why she did it. She did not mean us to stay."

Karel was trembling. He came close to them as though in search of warmth.

"But we can get the place going again, can't we? The generators on the ship will work—the men can make new machinery." There was no answer. "Even if we have to go away for a while," he desperately persisted, "we can come back."

"We shall go away," said Sudermark, "and we shall not come back."

The need for sudden action swept them out of their contemplation. There was work to be done on the ships, arrangements made for leaving. Personal belongings had to be collected and then checked over so that only the most essential things were taken.

"I can carry six extra

passengers to Earth," said Major Dunhill. "It won't be comfortable, but the journey is, fortunately, a short one. But the rest——"

"We have two ships," said Sudermark. "One will take only six people, but there is the small cargo vessel in which we brought supplies in the early days, when we were getting Orpheus into working order. There is room . . . just. It will not be pleasant."

They worked through the night that was not night—the half-light that came with blurred weirdness through the hazy shell of the satellite. Lights were run out from the ships to speed up the more vital jobs. Only when everything was more or less settled did the personal decisions begin to nag once again.

Jacob said: "I'm going back, as I said I would. But you, Gregor—which way are you going?"

Sudermark looked at Sandra, and at Karel. He glanced at the house in which stood his silent piano.

"I shall come with you," he said at last. "I believe in what is being organised on Earth. It is right and noble, and it is the greatest hope for the human race. But for myself . . . I believe I am better equipped for the struggle in a world that is not too uncomfortable." He smiled sadly. "I am not a pioneer, my friends. I am better fitted for fighting a rearguard action than for marching on in a vanguard."

Jacob turned to Karel. "And you, Karel?"

The boy looked at his sister, and then at the two men. He gave a last longing look at the house, as though praying that lights might spring up in the windows and restore the certainty and luxury he had always known.

"I'm coming with you," he said. Ideas began to build up in his mind. "There's plenty to do, isn't there?" he went on shakily. "Stratopolo, and travel, and . . . and everything. And the women. It'll be better than this place. And better than Earth."

He would settle down. Jacob saw what he would become. They must not lose sight of him; must not let him get out of hand. He was made for the propagandists and the stellavision demagogues.

Certainly he was not made for Earth.

Sandra said: "I think we have all chosen wisely."

"We shall all see one another again," said Sudermark. "Once the first troubles are over, there will be ships between Earth and the other planets. Sooner or later there will be a rational balance."

Their farewells were stiff and conventional. It was as though they had been guests in a hotel, and were now leaving to go about their work. There was nothing to be said; or nothing that dared be said between them.

Jacob shook hands with Sandra.

"Good luck," he said inadequately.

"Good luck," she said.

And that was all.

The ships rose, one after another, and were engulfed by the vastness of interplanetary space. The stars rushed back into being, and the sun flamed intolerably. A splutter of flame died into the infinity and one ship fell towards Earth. The other two swung in an arc and headed for Mars.

Orpheus went on its course. Turning in its orbit around the ancient mother planet, it was as dead as the Moon had once been. The grass would cease to grow, the trees would die. In time the structure would strain and there would be gaps. Then the satellite would be no more than a fragment of metal and stone, robbed of its water and its air, echoing no longer to the

music that had once been played there. The body of Constanza, buried in the soil, would be blown out into the void in dust.

It would be only a memory, an echo in the minds of those who had lived there—an echo of the things that had been done there and those that might have been done.

Sudermark's piano was silent. But somewhere else in the universe his music might sound again. Somewhere else he would summon up his powers once more, and the things that must be done would be done.

There could never be an end. Never. Always there must be new beginnings and new hope.

Roll Bonding—and Blowing

Continued from page 27

for the evaporator plate in refrigeration, it can do for many other industries. It has reduced retooling costs for new evaporator plates from £17,000 to £17, cut retooling time from six months to one week, lowered end product and production costs and increased the efficiency of the plates by more than 25 per cent. And, paralleling much current scientific research, the finished

job is better looking. The metal in the bond fuses to complete grain growth, which means that the various plates have become one single piece of metal, with the precisely engineering passages burrowing through.

The uses of this new roll-bond process are fabulous—like the process itself. That is just, in our modern scientific world, as it should be.

They don't like doing it, but there comes
a time when they must—

Blow the Man Down

by JULIAN CAREY

THE WORDS WERE DIFFERENT but the tune was the same.

Strange, thought Sam, how man's heritage of the sea had followed him into space. The rockets were always called "ships" and referred to as "she." A group of vessels was a fleet and, in the military, they still clung to the obsolete terminology of "navy," "liberty boat," "shore leave," and the ridiculous "fore and aft" and "port and starboard." The whole thing made a crazy kind of illogical sense as though man, afraid of his new adventurings, found comfort in the old, familiar things of the past.

*I'll sing you a song of the
men of deep space*

*Yo ho and blow the man
down*

*Of the places they see and
the girls they embrace*

*Yo ho and blow the man
down.*

There were other versions, of course, most of them quite ripe, but the chant line was always the same, and it was the one with the peculiar hurt.

Blow the man down. In space terminology it meant just what it said. Blow him down, ground him, strip his wings and dump him on a planet. Finish!

And Sam was due to be blown down.

Irritably he flipped the glossy pages of the magazine he had bought just before take-off. It had been a ridiculous expense, but he had justified it on the grounds of essential education. Now, as he stared at the lush advertisements and even more lush women, the chant line of the song seemed to take on a new directness as if the singers were mocking him. He twisted on the bunk and glowered at them.

"Why don't you guys pipe down?"

"What's that?" Meson, his carroty hair in its usual disarray, broke off the song and stared at him. "You said something?"

"I said shut up."

"What's the matter, Pop?" Fenwick grinned at him from the bunk opposite. "Things getting you down?"

"He's getting old and tired," sniggered Thorne. "To hell with him." He lifted his hand. "All together now, ready? Go!"

"I said to can it!" Sam dropped from the bunk, the magazine falling to the floor. "Give it a rest, you guys. Enough's enough."

"Nothing personal, Sam." Thorne looked scared. "What else do you want us to do?"

"How do I know! Play poker or something, but quit that yelling!" Sam was being unfair and he knew it. Monotony was the great enemy in space, and singing, especially group singing, had a tremendous morale-building factor. That was why the old shanties were so popular with their

easily remembered words and simple tunes. He forced himself to be calm.

"Sing if you want to, but try some other song. I'm getting sick of *Blow the man down*."

"You're not the only one that's getting sick." Fenwick didn't try to disguise his dislike. "Maybe it's a good thing that we're getting a new Quartermaster after this trip."

They knew, of course, the grape vine would have told them, but it hurt to find that they didn't care. Not that he could blame them, he had felt the same when younger, and, relaxing again on the bunk, he tried to lose himself in the magazine. The others, after a whispered consultation, swung into the piercingly sweet, heavily nostalgic strains of Shenandoah.

Listening, Sam felt again the self-pity and bitter rebellion at the sheer unfairness of it all.

He could continue in the service, he supposed. There were still plenty of jobs he could fill but, thinking of it, he began to have his doubts.

To remain attached to the service would be to constantly rub salt into his wounds. To see the ships land and take off again, to hear the talk of their crews, to be a part of, and yet not a part of the thing which really mattered.

Others had tried it. He remembered the gate-keeper at Port Benson on Mars, the storekeeper at Port Grimald on Venus, the tired face of the checker on Luna and the bitterness he saw every time he bumped into the watchman at White Sands. They were only a few of the many. He remembered others, many others but, in one thing, they were all the same.

They had all been blown down—and none of them could forget it.

They clung with pathetic eagerness to the one thing they considered really important. They snatched at crumbs where once they had enjoyed the full meal and, though they wouldn't admit it, those crumbs were the worst sort of meal they could have. They fed their souls on departed glories, tried to live in a world of make-believe,

and stubbornly refused to admit that they, themselves, were the failures, not the system they both loved and hated. Once it was over it was over. Once down, a man could never get back up again. He should accept that, forget the past and live only for the future and what the future would bring. And yet...

It was a lot easier said than done.

He riffled the pages of the magazine, trying to force an interest he didn't feel. Advertisements flickered before him, this year's new heliojet with the long, sleek, lissom lines and the three-tone colour scheme to match. With it, as always, was portrayed a woman, impossibly dressed and with an impossible length of limb to match her impossibly accentuated figure. Staring at it Sam didn't know whether he would rather have the heliojet or the girl. Maybe if he had the machine he could get that type of woman to go with it? Or if he had that sort of girl would he have to get the machine before he could keep her?

Problems. Always problems

—and he couldn't dodge them much longer.

Shenadoah had ended and given way to *What shall we do with the drunken spaceman?* He listened as it roared to its seemingly infinite ending and then, due to Fenwick no doubt, the hated strains of *Blow the man down* started again.

It was like receiving a kick in the stomach.

Desperately, in order to forget the mocking tune, he recalled the medical examination which had ended his life.

The doctors had been very kind but they couldn't disguise the verdict.

"You're too old, Mervin. Sorry, but that's all there is to it."

Old? He wasn't old, and he said so. They had shown remarkable patience.

"Look, Mervin, it's no good your struggling against it. You're not the first one and you won't be the last. There's a limit to what the human body will stand and you've reached it. You can't take high G acceleration any more. Your bones have grown

brittle, your arteries have started to harden, to lose their flexibility. There are other changes, and they all add up to the same thing. Stay in space and you'll die. Leave it and you can still live a normal life."

It was easy for them to talk and, buttoning his shirt, he had said so. He disregarded rank as he said it, letting some of his bitterness stream out in words which should never have been spoken to an officer. They had heard it all before a thousand times and had come to regard it as a normal reaction. They didn't let it annoy them.

"It's no good crying about it, Mervin. It comes to us all. Anno Domini is the one thing none of us have yet learned to beat. Sorry, but there it is. We just can't take the chance of you breaking down on us and becoming a liability." They had offered what they thought was comfort. "You're entitled to one last trip before being grounded. You can take your pick as to where you finally want to settle. Earth, Venus, Mars, anywhere you want."

He had chosen Earth, of course, and now he was enjoying the last space flight he would ever know.

*You'll know a true space-
man when he passes by
Yo ho and blow the man
down*

*He's got the gleam of the
stars in his eye
Yo ho and blow the man
down.*

It was sickening. Fenwick had never liked him, and now the man was deliberately needling him. Sam knew it and tried to ignore the roaring chant line. He couldn't do it.

"Shut up!" He dropped off the bunk and advanced towards them, his fists clenched. "Stow it, do you hear!"

The song faltered and died to silence. In the hush the eternal purr of the air conditioners sounded startlingly loud and, from somewhere, the sound of metal thudding against metal echoed from the bulkheads. Fenwick slowly rose to his feet.

"What's the matter, Mervin? Can't you take it?"

"I don't have to take it, especially from you."

"No?" Fenwick was enjoying himself. "Settle down, pop, before you bust a blood vessel." He looked at the others. "Maybe we should give him a night-cap, you know, something to keep his feet warm."

He laughed, the others joining in, and he was still laughing when Sam smacked him across the mouth.

"You...!" Fenwick touched his bruised lips. "You old goat! I'll get you for this after we land."

"Why not now?" Sam poised on the balls of his feet. "Come on, big mouth, let's see you beat up an old man."

"And get blown down for fighting?" Fenwick sneered. "Not on your sweet life. You're the only one who's leaving us this trip." Deliberately he sat down. "I'll attend to you after we land."

"I'll be waiting." Sam gulped and made himself open his hands. He was surprised to find that he was trembling. It had been a mistake to come back on his own ship, but he'd had little choice. Anyway, he had never

dreamed that the others had hated him so much.

"What'll we sing next?" Fenwick touched his mouth. "How about *Blow the man down* again?"

"Why don't you give it a rest, Fenwick?" Mason seemed uneasy. "Leave Sam alone. Hell, it'll happen to you one day."

"That's right," said Thorne. "It comes to us all." He reached for a deck of cards and began dealing out poker hands. He dealt one to each of them, Sam included, and it was probably quite unintentional that he hummed the hated tune beneath his breath as he did so. "Come on you guys, let's see if we can lift a little cash off Sam before he leaves us."

Sam hesitated, then sat down and picked up his cards. Normally he liked playing poker, but now he played with an indifferent carelessness foreign to his nature. Perhaps because of that very carelessness he turned out to be a consistent winner.

"Remember Hanson?" Fenwick shuffled and began to

deal. "He was blown down a couple of years back. Remember how we all chipped in to buy him a goodbye present?"

"A clock, wasn't it?" Thorne frowned at his cards. "Or was that for Greenway?"

"Greenway got the clock," corrected Mason. "Hanson got a portable radio."

"That's right." Fenwick shoved forward some chips. "I'll open for ten. I wonder what Sam here will get?"

"A clock?" Mason shook his head. "Not so good. A radio, then?"

"I'm strapped," said Thorne. "Make it something cheap." He looked at Fenwick. "You got any ideas?"

"I've thought of a couple." Fenwick squinted at his cards. "What would you like, Sam?"

"Nothing."

"Nothing?" Fenwick sounded surprised and hurt. "You hear that you guys? Sam says that he don't want a goodbye present. We can't have that, can we. We've got to buy good old Sam something. We can't let poor old Sam, the guy who's ridden us for so many years, blow down

without something to remember us by, can we?"

"You've got nothing that I want," snapped Sam, irritably. He knew that Fenwick was building up to something but couldn't see any way out. "Just leave me alone."

"What?" Fenwick set down his cards. "Not call round to see you after we land? Not pay a visit to chat over old times? You can't mean that, Sam."

"I do mean it." Sam felt himself getting more and more irritated. "I thought we were supposed to be playing cards."

"Cards can wait, this thing is serious." Fenwick tried to look serious. "I don't see how we can stop seeing poor old Sam. I mean, he'll probably be at the gate waiting for us so that he can show us off to his friends." He leaned forward. "Don't worry about that, Sam, old man. We'll tell them that you were once a spaceman in your youth. You can rely on us to back you up, can't he?"

"That's right." Thorne looked eager. "What are we going to buy him?"

"Something to show him just how we feel about him." Fenwick grinned. "Something sort of symbolic, you know, a little something that he can look at after he's left us and remember just how much we used to like him." He sighed. "It must be pretty tough being blown down. Just think, he'll look at the ships and he'll know that he can never ride in one again. We've got to do something about that."

"That's right," said Mason. He was grinning. "Something special."

"Such as?" Thorne looked eager.

"Well, now, let me think." Fenwick took a deep breath and Sam knew that he was getting ready for the pay-off.

Strangely enough he wasn't worried. It had been a shock to find out just how much they hated him, but he refused to blame himself for that. The regulations, he knew, were irksome, the discipline, of necessity, harsh. But both regulations and discipline had a reason and were founded on cold, common sense. One day they would realise that,

just as he himself had done. In the meantime they were intent on their hazing.

"It's a bit awkward," said Fenwick. "We don't want it to cost much, do we? I mean, do we want to spend money on old Sam or do we want to show the spirit behind the present?"

"No money," said Thorne, and Mason nodded agreement.

"That's what I thought," said Fenwick. "Well, how about . . ."

"Cut it out," said Sam, disgustedly. "You kids make me sick. So what if I did ride you? Hell, someone had to wipe you dry behind the ears. You think I've liked being cooped up in this tin can playing nursemaid? If you think that, then you'd better think again. You and your presents. Stuff it! If I never see any of you again that'll be too soon."

"Listen to the man!" Fenwick spread his hands. "To hear him you'd think that he never begged and cried to be allowed to stop on. You'd even think that he was glad that he was being blown down.

Or would he be trying to kid us?"

"I bet we see him opening the gate on our next trip," said Thorne.

"Or offering to carry our bags, or call a cab," said Mason, spitefully. "I've seen these old has-beens before. You can't spit on the ground without splashing a dozen."

"That's right." Fenwick shook his head. "And they hang around in the bars bumming drinks. To hear some of them talk you would think that they opened up space all on their own."

Space! Ships! Planets! Old songs! The shredding of reputations and the senseless spite of men with too little to occupy their minds. That was all they talked about. That was all they could talk about because they'd had experience of nothing else. To them space was the be-all and end-all of existence. They lived for their brief stop-overs whenever the ships landed, and lorded it with their coveralls and insignia among those who were too stupid to realise that there were other things than space.

And, when Sam thought about it, what was he losing?

Brief visits to spacefields rimmed with wire and littered with huts. One was exactly like the other, all processing points for unloading, reloading, and sending off the ships. The men were regarded as being merely part of the vessels they serviced. And in space? Boredom, monotony, the endless waiting from take-off to planetfall and with it the inevitable spite and nastiness of men forced to live too close together for too long.

Sam felt a peculiar shock when he realised that, in all his years of space travel, he had never once seen the naked glory of the unshielded stars, never stepped outside of the compounds, aside from that on Earth, never once seen anything of interest or experienced anything other than the dulling routine of ship-board.

Fenwick was still talking.

"I bet old Sam, here, is dying to know just what it is

we're going to get him." He leaned forward. "Eh, Sam?"

Sam rose and, picking up his winnings, returned to his bunk. Three more days and the trip would be over. Three more days and he would leave space and ships and the narrow-minded men who travelled in them. Three more days . . .

He relaxed and picked up the magazine. That heliojet, now? He wasn't too keen on the colour scheme, but he supposed that he could get it altered. And the woman, not bad either. He would have money when they finally discharged him, and he had a dazzling vision of himself in the heliojet, the woman by his side, idling over the field watching the metal prisons which were the spaceships take off with the youngsters behind him.

It was a fascinating thought and, as he relaxed still more, he sighed with anticipation.

It was worth being thirty years old in order to really start living for a change.

When you play with the fourth dimension
there is always more than one—

Time for Murder

BY SYDNEY J. BOUNDS

THE CORPSE WAS DRESSED in a well-cut suit of black pinstripe, with white shirt, stiff collar and black bow tie. It lay across a Persian rug with the pointed toes of patent leather shoes aimed at the ceiling. A neat round hole, rust-brown at the edges, spoilt the freshly laundered shirt.

Inspector Burton listened attentively while the local constable read aloud from his notebook.

"Gerald Laver, age sixty-three, financier, bachelor, lived alone except for one servant. Shot through the heart from a distance of three yards by a .45 automatic—that's the gun on the

table—died instantly. Time of death established by medical evidence, nine to nine-thirty p.m. Wrist watch smashed and stopped at nine twenty-one p.m."

Burton glanced at his own watch. It was ten thirty-two. "An hour ago. How did you get here so fast?"

"Tip-off by 'phone—anonymous, of course."

"The servant?"

"No. He was at the cinema—arrived back at ten three. We were here before that."

Burton's gaze shifted from the two C.I.D. men taking measurements to the gun lying on the table top.

"Any prints?"

"Yes, good and clear—he'll swing for this."

"Motive?"

"Established—this case is so easy, a recruit out of Hendon could wrap it up! Papers in the desk show that Clifford Webb, a research physicist, was heavily in debt to Laver, that tonight repayment fell due. With Laver dead, he doesn't have to pay a penny."

"Sounds too easy. Where's the catch?"

The constable shook his head. "No catch."

"All right," Burton said. "Let's pick up Webb."

They picked up Webb. The prints on the gun were his. The serial number proved he had bought the gun only a week before. He admitted that he was in debt to Laver.

Clifford Webb was arrested, charged with the murder of Gerald Laver and brought to trial.

He pleaded not guilty and, when the question of timing

was brought out, caused a sensation by proving conclusively that he was nowhere near Laver's house at nine twenty-one on the night of the murder.

As a member of the Royal Society, he had arrived at Burlington House at ten minutes to eight, listened with a hundred other members to Professor Smythe's paper—then, at eight forty-five, commenced reading his own paper on *Thermo-dynamics for a Space-Time Continuum*. He finished reading the paper at nine thirty-five, answered a number of questions and left Burlington House shortly after ten o'clock. With more than a hundred witnesses, his alibi could not be broken.

Clifford Webb was acquitted of a charge of murder.

Inspector Burton stared glumly at his desk and wondered how the gun that had killed Laver could clearly show Webb's finger-prints, and no others, if Webb had

not been the last man to handle it. He already had a headache from thinking about that.

His sergeant brought him a mug of sweetened tea. "Rough time with the commissioner, inspector?"

"The old man damn near read me the book. It's a perishing wonder I'm not pounding a beat again!"

The sergeant clucked like a sympathetic hen. "Odd sort of case, inspector. If it weren't for that alibi——"

Burton spluttered and slammed down his mug of tea. It slopped over the desk, ruining a report he was working on. "Don't mention alibis to me!"

The sergeant offered his cigarettes. Burton took one, flicked the wheel of his lighter and inhaled gratefully. The sergeant waited a few seconds, then said, hesitantly: "There was another odd thing I noticed——"

He paused.

"Yes?" prompted the inspector.

"I didn't mention it before because it seemed crazy—it still does, but maybe you ought to know about it. After you'd left Laver's house, I was alone with the corpse, waiting for the mortuary van to come. It was quiet in that room. Just me and the deceased—then, all at once, there was this rabbit."

"Rabbit! What rabbit?" Burton stared at the sergeant. "Did you say, *rabbit*?" he repeated.

"That's right, sir—a fluffy white rabbit with pink eyes and long ears. It was running round the room, then, suddenly—it wasn't there any more. Vanished right under my nose!"

Burton looked at his sergeant long and hard. "Drinking intoxicating liquor on duty?" he suggested.

"No, sir, hadn't touched a drop."

Burton thought of the fingerprints on Webb's automatic... and now a white rabbit! "You're not suggesting it was

the rabbit who shot Gerald Laver?"

"Of course not, sir. But it does seem odd, that rabbit coming from nowhere and then disappearing. I just thought I'd mention it."

Burton stubbed out his cigarette, taking his time about it, but before he could think of an adequate reply, the telephone rang. He picked up the receiver. "Yes . . . speaking. *Who?* I see . . . I'll come over right away. Goodbye."

He cradled the 'phone thoughtfully, turning to the sergeant. "Guess who?" he invited.

"The commissioner?"

Burton glared. "You've a lousy sense of humour. No, that was Clifford Webb, and he wants me to call on him."

"Perhaps he wants to confess?" the sergeant suggested.

Clifford Webb was a head taller than Burton, a rangy man with a sharply-pointed nose and eyes that never quite seemed to focus in one place.

He was wearing a white laboratory coat as he greeted the inspector.

"Nice of you to spare the time, inspector. Can I offer you a drink?"

"Thanks, no."

Webb grinned sardonically. "Could be you object to drinking with a murderer!"

Burton refused to be drawn. Looking round the comfortably furnished room, he asked: "What did you want to see me about?"

Webb waved him to a chair, then moved across to the fireplace. His eyes focused briefly on Burton's face.

"As I understand the law," he said, "now that I have been acquitted of Laver's murder, I cannot again be charged with that crime. Correct?"

Burton nodded.

"Good! Now, inspector, prepare yourself for a shock. I did kill Gerald Laver—and I'll tell you how."

Burton took a cigarette from his case and lit it. "Just why are you telling

me this?" he asked, bluntly.

"Vanity, inspector, pure vanity. I have committed the perfect crime. Naturally I want you to know—now that you can't do a damn thing about it! I thought you might have guessed from the title of the paper I read to the Royal Society. Remember? It was called *Thermo-dynamics for a Space-Time Continuum*. Time, inspector, that's the clue you missed . . .

"Time is an imperfectly understood medium. Perhaps dimension would be a better word. The fourth dimension it is usually called. An object can have its position in space fixed by the dimensions of length, breadth and depth—but unless we say that it exists in this space for a certain *time*, how can we say that its position is fixed at all?"

Burton declined to answer.

"I have long desired to experiment with the dimension of time, to travel through the fourth dimension as we now

travel through space, and it was Laver who gave me the opportunity. He advanced the money for my experiments. He wanted a machine that would travel into the past, thinking by this means to cheat death and attain immortality! He did not realise that such a transference would automatically set up a new future for himself, involving a new death."

For myself, I was interested in the practical applications for crime. Not that I have any interest in crime, as such, but scientific research costs money and I saw the chance of getting that money. For instance, I could retreat into the past, commit a robbery, then return to the present and fix an unbreakable alibi. Interested, inspector?"

Burton nodded, shredding the end of his cigarette with his teeth.

"I succeeded," Clifford Webb continued. "I built my machine, and now, if you will follow me, I'll show it to you.

But don't expect anything spectacular—this isn't Hollywood."

Burton followed the physicist through a door and along a passage to the laboratory. In the centre of the room, he saw a door-frame surrounded by the coils of wire helices. A control panel was marked off in an elaborate time-scale.

"Doesn't look much, does it, inspector? But I can assure you it works . . ."

Burton looked at Webb and knew that if he wasn't dealing with a madman then he was with a murderer.

"How?" he grunted.

"The maths involved are of a very high order," Webb said, "so you must be content with analogies. When I pass an electric current through my helices, a field of energy is created which distorts the space-time continuum. Space as well as time, you will note. In effect, I can step through my door frame into another time and arrive at a different location from this room."

"I still don't see how you faked your alibi," Burton grunted.

"But it's so simple, inspector. I had already decided to kill Laver—he was threatening to foreclose on his loan. I attended the Royal Society, arriving back here about half-past ten. I adjusted the time-scale of my machine to nine twenty, the space location to Laver's study. Then I stepped through."

Webb's eyes glittered, his breath quickened.

"As I expected, I was in Gerald Laver's study—and he was taken completely by surprise. I shot him, 'phoned the police and returned here. I had only to wait for you to prove my alibi!"

"I still don't see how you could be in two places at once," Burton said.

"How can I explain it? Time is not like a river flowing in one direction. Think of it as a tapestry; the flow of time corresponds to the warp, the lengthwise threads

—but there is also the woof, the crosswise threads. These represent our position in the time-stream—and note please that the warp has *infinite* threads. Perhaps you can imagine it as a series of parallel worlds; we have a possible existence in each but are only aware of one! I killed Laver in another world, on a different warp of the tapestry . . . things might have gone wrong, I admit. When I returned, Laver might not have died in this world. My interference with time could have upset my alibi. Perhaps I would have been stranded in that space-time where I killed Laver. Anything might have happened, but I was lucky and it worked out the way I planned.”

Burton threw away the butt of his cigarette. “And now that you’ve been acquitted, you are perfectly safe,” he said, slowly. “Yes, you’re right—it is a perfect crime.”

Webb smiled complacently.

“Perhaps you’d like to see a demonstration, inspector?”

Burton nodded, and the physicist switched on the power and made an adjustment to the time-scale. The helices began to glow and, between the limits of the door-frame, appeared a blackness so intense that the Inspector could not bear to look into it.

Webb removed a white rabbit from a hutch on his work bench.

“Daisy,” he said, smoothing back the rabbit’s long ears, “is the world’s most experienced time-traveller. I’ve used her for many experiments and she has always returned unharmed. I doubt if she knows what a remarkable rabbit she is!”

Burton stared, remembering his sergeant’s story. The hairs at the nape of his neck began to bristle.

“I am sending her back to a period a little after the time of the murder,” Webb said, “the location as before—Laver’s study. Perhaps one of your men reported seeing

Daisy? In which case, we mustn't disappoint him . . ." He set Daisy on the floor before the door into time and gently urged her through it. Instantly, she vanished from view.

Burton walked warily round the door in the centre of the room. He completed a full circuit without seeing anything of Daisy.

"Convinced, inspector? She will appear again in one minute—I have set the automatic control for that period."

The seconds ticked by. Burton studied the time-scale carefully; a plan was shaping in his head, a plan to bring Clifford Webb to justice.

"Here she is, inspector!" the physicist exclaimed triumphantly.

He lifted the rabbit from the floor and placed her back inside her hutch.

Burton moved silently and, as Webb turned from the hutch, swung his fist to the physicist's jaw. Webb slumped unconscious to the floor.

Burton studied the controlling mechanism of the time machine yet again. It seemed simple enough. He adjusted the time-scale for nine twenty of the night of the murder. Webb had already told him that the space location was Laver's study. He had only to step through to catch the murderer red-handed.

He took one last look at the unconscious form of Clifford Webb and stepped between the glowing helices into blackness . . .

There was the Persian rug, but Laver was not now stretched out upon it. The financier faced Clifford Webb, staring fascinated at the gun in his hand. Webb's finger tightened on the trigger.

"Stop!"

The command was torn from Burton's lips as if of its own volition. Webb half-turned, amazement written plain across his face—and, in that moment of hesitation,

Laver hurled himself across the room to grapple with his would-be murderer.

Burton heard the shot; and saw one of the two men stagger and fall across the Persian rug. He looked down.

The corpse had been a rangy man with a sharply-pointed nose. The eyes, which in life had never quite seemed to focus in one place, were

now focused in death on the ceiling. Clifford Webb had paid in full for his intended crime.

"It was self-defence!" Gerald Laver screamed. "You saw it—he threatened me—I killed him in self-defence!"

Inspector Burton scratched his head and wondered what the commissioner would make of his report.

THE FOUNDLING DUMMY

Continued from page 43

tables on the guests, and there was a lot of laughter. The important words came up suddenly. A woman started it, and as nearly accurately as I can recall, the conversation was as follows: "Your clothes look a little seedy, Rachel!"

"You're just jealous." (Laughter).

"No, I'm not. I wouldn't want to sit on his lap all the time, the way you do."

Morley's face was blank, and there was no change of expression.

"Why don't you try it, honey? You might like it."

"Why, Rachel, you know you'd be jealous!" The woman was more confident now, and was beginning to enjoy her verbal tilting.

"Darned right, I'd be jealous!"

"What would you do about it, Miss Hideous?" (Low laughter).

"I'd kill you."

"How would you do that? You seem so helpless."

"I'd push you off a cl——"

Morley suddenly came to life. He looked at the woman; he looked at the other guests; he half-smiled.

Rachel spoke again: "I really wouldn't kill you, honey; you're sweet."

That was all there was to it. After a while Morley put the dummy into a suitcase, briefly joined the group in conversation, then went home. We came for him that night.

Not only aliens make a good—

Showpiece

by LESLIE DAVIES

IT WAS A WARM SUMMER'S evening when Syd Hamilton and Jack Bush parked their car by the field and looked out thoughtfully over the vast countryside. Being summer, it was still light and they could see the many meadows and fields that were untouched by human habitation; the quiet countryside was the perfect place to be when there were problems to figure out—and the two men had plenty of problems on their minds.

They were two good looking young men, though inclined to be a little over dressed; long full-draped jackets with loud patterns, gabardine trousers cut on the drain-pipe style, spear-pointed coloured

shirts and bright bow ties. Syd Hamilton and his partner, Jack Bush, were fairground grafters. They had worked every game in the business: coconut shies, dart throwing, shooting galleries, small side-shows and even photographs—but now they were stuck.

The mental telepathy act which they had been running at the nearby seaside resort had folded up like a concertina, the game was played out and it had been useless for them to continue haranguing the disinterested holiday-makers and they had closed up. But they still had the pitch which had to be paid for, and they had come to this lonely spot to try to think of something else.

"I don't know," said Syd to the other. "I guess that everything had been done by now. Maybe we ought to give in and try and find normal jobs?"

The remark had come after they had spoken for an hour and it shocked his fastidious friend.

"What!" Jack ejaculated. "Don't even say that in a joke. It's enough to make your old man turn in his grave—what a thing to say after he spent his life teaching you the ropes!"

"Well, we've got to do something. That pitch has to be paid for, besides us making a living. We could——"

Suddenly, he stopped and his eyes opened wide. The other man turned to look at him, then followed his gaze, which was upwards. Like his friend, he, too, opened his eyes wider and stared at the sky.

The object of their attentions was a flying saucer that had come from above the

clouds and was now hovering in the sky.

Jack was the first to find his voice. "A flying saucer!" he exclaimed. "It's true! There are such things! Gee! If only I had a camera—we could sell the photographs as easy as hot-dogs."

"Look, it's coming down," cried Syd Hamilton. "Maybe we ought to get out of here and 'phone the cops or somebody?"

"Better stay where we are. They may see the car and we don't know how friendly they'll be."

The two friends got out of their vehicle and made towards the hedge at the side of the field, then, settling themselves out of sight, watched the huge saucer-like object land quietly in the middle of the field. They could feel tingling sensations as a trap door in the side of the flying saucer opened and the figure of a man stood there. The man looked like an ordinary human being except for some slight

differences. His hair was long and flowing to his shoulders, the skin of his face was as smooth as a baby's cheek and, except for his clothing, was like an ordinary earth man. He wore a garment that appeared to be a siren suit, the colour was purple and it seemed to have no way of fastening it, no buttons or zips were in evidence.

After looking about him he turned inside his machine and called out in a strange soft tone and in a strange language, then walked down the steps of the trap door onto the field. Two more men came after him; they were the ones he had called to, and joined him on the grass. They looked about themselves and started to converse.

Hamilton stood up. "I'm going to speak to them," he said. "They look harmless enough."

"Don't take a chance," said the other. "You can't tell by appearances."

"Oh, they're all right. Look

at them," Syd said. "They're carrying nothing and they've nothing strapped round their waists. You can see they're not armed. I'm taking a chance. Are you coming with me?"

For answer the other got up and walked with him into the field.

As they approached the three flying-saucer men, they smiled and were gratified to see the latter smile back at them. Jack whispered to his friend: "Hey! How are we going to understand them?"

"Gee! I hadn't thought of that," returned the other. "Tell you what. Let's try them in some foreign languages."

When they reached the three strangers, Syd blurted out: "*Parlez vous Francais?*"

The first stranger answered: "*Oiu, mon ami.*"

The two earthmen looked at each other. Neither of them could speak French.

"*Sprechen sie Deutsch?*" Jack said quickly.

"*Ja, mein Herr,*" the stranger said.

The two earthmen again looked at each other. Neither could they speak German.

"Gosh, it just shows you, education is a wonderful thing," said Syd to Jack.

"Oh, you speak English?" the stranger said. "I'm so glad. English is my best tongue."

The two grafters stared at him dumbfounded and did not speak.

"Ah, I see you are mystified by the fact that we can speak all your planet's languages," went on the stranger. "But I can explain simply. For years we have been picking up your radio and television broadcasts on our interstellar wave sets. It was but a simple matter to decipher them and learn how to speak the different ways in which you express yourselves. It was difficult at first and we kept on getting confused until we realised that you have several languages, and not just one like we have, but, as you can see,

we have mastered every one of them."

"Where are you from?" asked Syd, who wondered whether he was dreaming.

"It is no use my telling you the name of our planet, you would not be able to pronounce it."

Jack, trying to show friendliness, said: "My name is Jack Bush and this is my friend, Syd Hamilton."

"I am Targ," the first stranger said. "And my friends are called Garvo and Cem."

"How do you do?" Syd said, and offered his hand.

The hand was ignored but the Earthmen realised that it was not through rudeness. People probably did not shake hands where they came from.

"Would you like to see the inside of our spaceship?" asked Targ.

"I sure would," Syd said.

"Then please follow me."

The two Earthmen were taken inside the flying saucer where they were shown the wonderful intricacies from the

other world. Had they been scientists, they might have understood all the things that the aliens were explaining to them, but alas, Syd Hamilton and Jack Bush knew only one science—the science of making money.

It was the latter science that started the quick wits of Syd moving when he asked: "May I ask you why you have come to the Earth?"

"Certainly," Targ retorted. "We have come to study your planet and its inhabitants. It is true that you are a backward world, but there is much we would like to know. We stopped in this remote spot because we are a little afraid of your people. We have observed that they are war-like and cause many atom explosions—that is one of the things we wish to find out. Why are your people always warring on each other, and why do they destroy part of their planet?"

"Mr. Targ," said Jack Bush. "You have just asked the sixty-four dollar question.

I don't think anybody could answer you that."

"At least we shall try," the alien continued. "And, perhaps, you will help us in our work?"

"Sure we'll help you," Syd said hastily. "What do you want us to do?"

"Could you take us to a place in one of your colonies where we could meet different people? We wish to meet all sections of life here, from scientists to children."

"You can bet your sweet life we can," Syd said exultantly, to his friend's amazement. "We've got a pitch all set right on the sea front in the busiest resort in the country. Everybody comes to it—from all over this planet. If you'll leave it to me, you'll be seen—I mean you will see everybody!"

"But, Syd——" Jack tried to cut in.

"What is it?" asked his partner.

"You can't give the pitch. We've got our living to earn,

what about the new ideas we were going to think about?"

"Shush, and don't bother me," returned Syd. Then he turned back to the aliens. "Mr. Targ, there is one favour I'd like to ask you?"

"If I can repay your kind offer, I will."

"Good. You see, my partner and I have to earn a living—do you know what I mean?"

"Certainly," said the alien. "We on our planet also have occupations by which we earn what you call money, though ours is a different type to yours."

"Well, you see, this place which we'll take you to, has to be paid for with money, which we are short of right now. But we can make some if you'll co-operate. You see, we are the first Earthmen to find you. We can charge an admission to all people whom you wish to interview, and for that charge, we can also show them around the flying saucer—sorry, I mean space-

ship. We'll charge only a small fee and we can make plenty on the turn-over. We can go fifty-fifty. What do you say?"

"H'm, I see," Targ said thoughtfully. "You are a showman. Well, as a scientist, I should refuse. We have showmen at home also, and I have never approved of them, but you are sincere and honest about it, so I shall agree. Incidentally, I do not wish any of your earnings—your money would be of no use to me."

"Gee, that's great!" Syd cried. "You'll never regret this, Mr. Targ. I'll bring you as many people as you want to meet."

The men from both worlds continued talking till the early hours of the morning. The conversation was merely the answering of questions by Syd and Jack to the aliens' queries, and when the latter had gleaned all they could from the Earthmen, they finished the discussion and

arranged to meet on the morrow.

It was with excited hearts that the two partners made their way home.

"It'll be the greatest attraction since the old Barnum days!" Syd remarked to his companion. "Just think of it. The first flying saucer to land with strangers from another world in it—and we find them first. By the end of the season, we'll be millionaires!"

"Do you think we'll get away with it?" asked the other.

"What do you mean—get away with it? We're bound to. They're genuine, aren't they? They're not the headless woman, or the living mermaid, which are merely trick illusions. They are the real thing. I've always said it, Jack—give the public the genuine thing!"

Jack looked at his smiling and satisfied friend and murmured: "Well, it is a change, isn't it?"

It took a few days for Syd and Jack to get everything

organised. Placards had to be made, adverts put all over the town and a special opening date in the local newspaper.

They cleared their pitch of all old props and on the third day of the aliens coming, had the flying saucer placed in the centre of the pitch. This was done at five o'clock in the morning when everything was quiet and nobody was about. Syd and Jack placed lights in the area where the vessel should go and the aliens guided their silent craft into the correct position.

The great day came soon enough. Crowds were lined all along the promenade, all queuing before the huge flying saucer which stood in a prominent position amid various amusement arcades and carnival sideshows. In front of a roped-in barrier was a large placard on which was written: THE ORIGINAL FLYING SAUCER, and underneath, in smaller letters, Admission 1s.

At two-thirty sharp the show began. Jack stood at

the entrance collecting the customers' shillings while Syd guided the people to where the aliens sat in the centre of the flying saucer.

Syd rubbed his hands gleefully. The shillings were rolling in and he reckoned that a few weeks of this and he was made for life.

But the first day did not go according to plan because all of a sudden there was a stoppage. The vessel was crowded and people waiting to enter could not go in. Syd rushed to the entrance and said to Jack: "What's the matter? Why has everything stopped? Don't you know we're losing shillings by the minute?"

"It's not me," retorted the other. "They've stopped inside."

Syd rushed back into the flying saucer and pushed his way through the people who waited to speak to the aliens till he came before the latter. Targ and his companions were at that particular moment,

speaking earnestly to a housewife.

"Mr. Targ," Syd said, carefully controlling his anger. "Why have you stopped people from entering here?"

"I have not stopped anybody," returned the alien. "I want as many people as possible to speak to."

Then Syd realised what was wrong. The aliens were glean-ing every bit of information they could get from every person they spoke to. It took time to speak to everyone individually—at this rate they wouldn't get more than six people a day inside the vessel!

Six people a day! That represented six shillings a day! Syd groaned in despair.

He rushed forward and took Targ aside. "Can I speak to you?" he asked.

"Yes, of course," said the other and followed Syd to the control room, which was private.

"Mr. Targ," Syd began, pleadingly. "Do you have to

“speak to every person that comes into the ship! At this rate Jack and me will be bankrupt in a month! Couldn't you just meet a few select people?”

“I suppose we could do,” Targ said thoughtfully. “Yes, I'll do it, on one condition. That you bring me one of every type of earth dweller there is—from the housewife to a scientist.”

“It's a deal!” Syd cried happily.

True to his word, Syd saw to it that only a certain selected number of people spoke to the aliens. His method of discrimination was simple. He merely put up a new notice over the front of the flying saucer. **ADMISSION ONE SHILLING TO GO THROUGH FLYING SAUCER—FEE FOR PRIVILEGE OF MEETING ALIENS, THIRTY SHILLINGS.** As he had supposed, not many people would spend thirty shillings just to talk to the people from outer space, but there were

just enough of the science-minded people to fill the requirements of the aliens.

The next two weeks were very lucrative to the two partners. The wonderful phenomenon of the aliens' visitation became nation-wide news, people came from far and wide to see for themselves the living proof of the grafters' assertion. Scientists, too, came in their scores to see what had been a mystery for so long, and Syd and Jack sat back with pleasant satisfaction.

But their satisfaction was short lived. As in all things, the success of some, breeds jealousy from others. Their trouble came from one, Gilbert Blythe, the man who had leased them the pitch. This grey-haired, greedy property owner had leased them the pitch thinking that it was the worst position on the promenade. He did not like the idea of somebody else making money without himself having a substantial share of it, and he accordingly got in touch with his solicitor to see if the

latter could find a loophole in the agreement he had been so willing to sign.

It was a busy day when he called on the two partners with the solicitor at his elbow. He went straight up to Syd, who was at that particular moment talking to his partner.

"Mr. Hamilton," he said, addressing the younger man. "I regret to say you have violated the contract which we drew up."

"What!" cried Syd, with chagrin in his heart. He knew the other man only too well. "As far as I know, we're not doing anything we shouldn't do."

Mr. Blythe shook his head sadly. "I'm sorry, young man, I'm afraid you have."

"In what way?"

"You were leased this pitch for the purpose of plying some carnival game here, or a mock-auction, or displaying a trick illusion. It did not say you can display a flying saucer."

"But what's wrong with

that?" Syd cried desperately. He did not understand the law too well and had not the faintest idea whether he was breaking the contract or not. "This flying saucer is genuine, so are the aliens that are in it—they really are men from outer space."

"That's just the point, young man." It was the wily solicitor that spoke. He came nearer to the crestfallen partners and smiled towards his employer. "The agreement says you can display a trick-illusion, which means if you want to show a fake flying saucer and actors to play aliens—that is all right, you are keeping within the agreement. But showing anything genuine is not. There is nothing in the contract that allows you to show a genuine flying saucer, nor genuine aliens. I'm afraid that Mr. Blythe can order you off the site at a moment's notice!"

The two partners looked at each other in alarm. To think that they could lose everything for being genuine?

"But surely you wouldn't do that to us?" Jack pleaded.

Gilbert did not answer but just smiled evilly.

"You won't take over," said Syd firmly. "These aliens are pretty nice fellows. They're taking nothing from us and are in no way avaricious. You can't bribe them because they want nothing material. Don't try and push us off or we'll all have nothing."

"There is something in what he says," said the solicitor to Mr. Gilbert Blythe. "I would advise you to become a partner."

"You heard what my solicitor suggests," Blythe said. "You take me in as a fifty-fifty partner and I'll do nothing. Well? What do you say?"

Syd looked helplessly at Jack, then nodded assent wearily.

"Good," Blythe said warmly. "That's settled. Now we're going to see the aliens."

"What for?"

"I'm going to make them

sign a contract. It's all drawn up for them, and it gives me exclusive rights of their personal appearance. Nobody else is going to get in on this."

"You can't do that!" Jack cried. "The idea of a binding contract to show them off is an insult to them. These men are scientists, they're only doing that as a favour to us."

"Don't hand me that," returned the hard Blythe. "Nobody does anything for nothing. I'm doing it and you better not try and talk them out of it or else I'll see to it that you don't graft in this town again."

With the serious threat to their future livelihood, the two young partners did not argue any more, but silently followed the solicitor and Gilbert Blythe inside the flying saucer and to the aliens.

The status of the grey-haired man and his lackey was explained as diplomatically as possible to Targ, who listened in silence. His face did not betray his thoughts

until the contract was mentioned.

"What!" cried the aliens. "You wish us to bind ourselves to you for the display rights?"

Syd came forward quickly and said: "Please, Mr. Targ, can I speak to you in private for a few moments?"

"Very well," answered the alien, looking stern.

They went into the control room where Syd explained his precarious position.

"So you see," he finished, "if you don't sign, Blythe will ban me from the town and I'll lose my livelihood. It means a lot to Jack and me to work here in the summer. Please sign, Mr. Targ. It really means nothing to you because you will soon go back to your planet, anyway."

The alien spent a few minutes thinking it over. He seemed sorry for the two young men. "All right," he said, "I'll sign, for your sake."

Blythe's face was a picture of triumphant satisfaction

when he heard the alien's decision and he placed the contract before him.

"A moment, please," said Targ. "If I sign this contract, I must insist that you sign one for me. After I spoke to my young friend here, I had Garvo draw up one." He showed them a parchment written in the undecipherable alien language.

"What is it about?" Blythe asked cautiously.

"That I will not tell you," was the alien's answer.

"It's all right, you can sign it," said Blythe's solicitor. "It won't be legal, anyway, no matter what is written on it. There is nobody who can understand their language, so if there is anything you don't like in it—it would be your word against his."

"Okay," Blythe said, with a smile. "I'll sign it."

The two documents were signed by Gilbert Blythe and Targ, the alien, and the former became the partner of the two young grafters.

The weeks that followed continued to be lucrative, but far from happy. Gilbert Blythe proved himself to be a most obnoxious partner and something of a tyrant. He insisted that the aliens should meet Earth people in a separate hut where he could keep his eye on them, and he employed his own men to watch the takings and to guide the public round the flying saucer.

The way he treated the aliens was nothing to be desired, and Syd Hamilton wondered why the latter stood for Blythe's bullying manner. He went over to Targ one day and spoke to him about it.

"I don't see why you stand it," he said to the alien. "If you are staying here on Earth because of Jack and me, forget it. Money doesn't mean that much to us that we should have to stand by and see a man like you treated like dirt. I should return home if I were you."

But Targ shook his head in the negative. "No, my friend.

We both signed each other's contracts. I stay here until I've completed my mission."

"Didn't you say that your mission was to find out why the peoples of Earth were constantly warring with each other?" asked Syd, with a thoughtful look on his face.

"That is one of the reasons," agreed Targ. "As a matter of fact I have found out all I need to know about the Earth's human race, but it is just that phenomenon that eludes me."

"You need study no further," said Syd. "I can tell you why wars are caused. You have living proof in Gilbert Blythe. That man will do anything to get what he wants—it's greed! It's men like him that cause wars. They get greedy for other countries and so attack them. If they conquer, their greed is sated only until they see something else they want; if they lose, they say—'well, we tried, anyhow.' But it is their greed that causes the deaths of other people."

The alien stood up suddenly. "Of course," he said. "There's the answer to my whole problem and I have proof in Blythe."

"You certainly have," agreed Syd.

"You were right, my friend. My mission is ended. We shall leave when darkness comes."

Syd Hamilton did not tell Gilbert Blythe till the last minute that the aliens were leaving. He and his partner were with Blythe and the solicitor when the news was unfolded. On hearing the aliens' decision, Blythe leaped to his feet in anger.

"This is monstrous!" he cried. "What kind of principles have they got to break a contract?"

"The contract was for ten years," the solicitor broke in, smoothly.

"Right. We'll soon see about this. Come on, you two, I'm going to see them."

The two partners smiled

at each other as they climbed into the back of Blythe's car to be taken to the site of the flying saucer. The solicitor sat in the front with Blythe, and he was instructing his employer on the legal aspects of the case.

The foursome arrived at the pitch and they hastily made their way inside the flying saucer and came upon the three aliens, who were checking the instruments for their long flight home.

"What is the meaning of this?" Blythe demanded. "You are breaking your contract with me. What kind of men are you aliens?"

Targ smiled and answered: "The contract is only legal on Earth, my dear Mr. Blythe. Once we leave here, there is no contract."

"You won't get away. I'll see you gaoled for this!"

For answer, the alien merely smiled at him and turned to Syd Hamilton and Jack Bush.

"My dear Syd and Jack," he began. "I want you to

know that our association has been a pleasant one, and before you go, I would like to greet you in your custom." He stretched out his hand.

Syd and Jack, in turn, shook hands with him, then Targ went on: "I think you should go now, while I deal with these two." He indicated Blythe and the wily solicitor. "Goodbye, my friends."

"Goodbye, Targ," Syd replied. "I hope we meet again."

"Goodbye, Targ," Jack echoed.

The faces of Gilbert Blythe and his solicitor broke into scowls as the aliens saw the other two Earthmen to the entrance of the flying saucer, then when Targ returned to them Blythe said:

"Now, then, Targ. If you are a man of honour, you will

not go. I demand that you stay on Earth."

But the alien ignored him and raised his hand in a signal to his fellows.

It took a few moments for the two Earthmen to realise that they were airborne, but when they did realise it Blythe shouted: "What's the meaning of this? Put down, immediately!"

Targ smiled and answered: "No, Mr. Blythe. If you are a man of honour, you will not give us any trouble. Now that we have left Earth, the contract you made me sign is finished. But you signed a contract that I drew up. You see, Mr. Blythe, that contract gives me full rights to display you at home. I am sure that the people on my planet will find you very interesting.

After years of training, this was the time for——

DEPARTURE

by BOB SHAW

ABOUT ONE THIRD OF THE way up the hill, Sellers realised that he had underestimated the little robot. He had run himself out climbing five hundred feet in fifteen minutes in an effort to lose Samel but, now that he had stopped his upward scramble, he could hear the hum of robot motors not very far behind.

Once before, as a small boy, he had experienced a feeling similar to the one he had now. On the evening a lost pup had followed him for company and he had had to run to lose it behind him in the gathering dusk. His father would never have allowed the pup in and, anyway, even then, he had been afraid of forming friendships. That had been a long time ago back on Earth.

Sellers stopped for breath and glanced around the darkening hillside below him.

None of the larger moons had risen yet and he could discern the several bobbing motes of light that were the pursuing robot. Realising the futility of running on, Sellers sat down on an outcropping to wait for Samel to catch up.

The home galaxy hung bright in the south, extending almost to zenith—a misty citadel in the sky, whose every outflung battlement was a million suns. The hub is far behind now, thought Sellers, feeling the old and familiar pain of joy shot through with sadness. His eyes tracing the star rivers of frozen light picked out a cluster of bright points just above the horizon and a smooth, symmetrical pinnacle that was barely visible thrusting blackly into the sky. Sellers watched it for a time, then quickly jerked his eyes down to where Samel was labouring up the long slope. He had forgotten

that once he attained some height he would be able to see over Nallga Hill to where the big ship was sitting.

His face began to burn with mounting blood, and his eyes tingled momentarily. Shame or guilt, he wondered, or was it both? "Why either?" he demanded aloud, "I'm not a criminal."

Sellers choked off the thought. He had been over all that too many times already. Samel was almost up with him and he became aware that the robot was singing as it climbed. An old robot whose association units were jammed and corroding into one another often developed a pseudo-personality which led it to dredge at random into its memory banks. Although Sellers knew the reason, he found it hard to think of it like that, as the words of an ancient song that Samel might have heard a thousand years before, reached him.

*... now I'm sorry I have sinned,
For I dream as the hammer
strikes the anvil,*

*And I dream as each spark falls
on the floor,
I dream of . . ."*

The little robot broke off when he saw Sellers waiting for him. He plodded up to where Sellers was—an oblong box on four telescopic legs and surmounted by a revolvable casing which housed the pick-ups for his various senses and his communications system. Sellers checked himself as he realised that he was beginning to think of Samel as a personality, soul-less, without even the hope of the collective immortality of his kind—a futile, transient flicker of consciousness trapped in a metal coffin.

"Samel," he said, "why don't you go back to the village? The hill gets steeper from here on—you couldn't do it."

"You bought me," Samel pointed out in his perfectly modulated but archaic speech. "And besides, you remind me of the time when I was new—notice how my self-preservation circuits make me

worry and feel less happy as my body begins to fail? You're a representative of the highest culture level that has been attained in the Hub stars since the technology crest that produced me. I can't help myself, my sp circuits drive me to you. About you there is an air of know-how, of techniques that might mean repairs.

"What do you know about Century Twenty Five?"

"I've already told you—*nothing!*" said Sellers, shortly. "They don't bother about history now." He glanced at his watch and jumped to his feet—it was coming near the meeting time. "Go back home. You don't owe me anything. I release you. Clear out."

He zipped his tunic down further, realising the warmth of the night and recommenced his climb, reaching high with his thighs and leaning forward against the rise of the ground. It was now quite dark, but he had come to know this part of Alcord well since the universe ship had put down on

it twenty days before. Behind him Samel's motors, which had once been noiseless in operation, whined into life.

Sellers quickened his pace. Samel was a weird chara . . . no, not character, he interposed . . . a mechanical freak. Get out of that habit, he ordered himself, a robot is a machine designed to do a job. He wondered what Samel's task had been when he was brought out to the periphery. The robot had no extensible grapples or other manipulators, so it was probable that it had been a monitor or an advisor. When the peak culture wave of Century Twenty Five had subsided and contact with the Hub stars was lost, this world had retrogressed to its present pastoral level.

A planet will shape the *gestalt* personality of its people and this was a leisurely backwater. None of the subsequent explosions of humanity from the Hub stars had reached Alcord, the outermost of all planets, and the memory of the glorious days

of the Empire had been gently erased. The farmers and gypsy traders cared very little for the future and even less for the past . . .

Moree was already there when he reached the straggling cluster of trees at which they had agreed to meet. As he approached her she was only a pale, impersonal blur in the aureate glow of the moon that was beginning to rise against the whiter, colder light of the galaxy. For a moment he wondered if he was making a mistake—he *could* make mistakes, had made them before. Now that he was walking to meet her and the time was so near he felt weak . . .

When she saw him, Moree ran out from the trees and she felt very warm and reassuring in his arms. As Sellers held her he was her accepted lover, and as she returned his kiss she was his mother who had died, the sister who could never be and the wife and daughter that were denied to him by decisions and vows of loyalty

made in his boyhood. Sellers held her tightly and breathed in the woman smell of her hair.

"I was here early," she said. "It seemed a long time before you came."

"Were you frightened?" he asked, and was surprised when she began to laugh.

"What of?" she queried. "My only fear was that you might have changed your mind."

"Oh yes—I forgot. This is a very safe sort of a planet." Sellers wondered at the brief, illogical resentment that flickered in him. "And you know I would never change my mind."

"I *do* know," she whispered, "but there is so much . . . what's that?" She jerked her neat dark head and Sellers felt her fingers grip his shoulders. The song was faint and in a language that Sellers had never heard.

“. . . n'est plus rien, rien qui m'enflamme:

*Je languis triste et sans desirs;
Mais il est au fond de mon ame*

Une image et des souvenirs."

"It's only Samel," said Sellers, smiling. "I couldn't shake him off. He thinks I can fix up his failing memory and noisy gears."

Moree stiffened in his arms. "You should have done something," she said petulantly. "You know I can't stand it near me. It makes me afraid. The merchant you gave your gloves to for it has told everybody what a fool you were, too."

"On any other world but this one," Sellers replied, almost curtly, "Samel would be worth a million pairs of gloves. Just think of it—a high IQ robot built in the peak days of the old Eleventh Empire. The idea of such a machine standing in for a cash register for generation after generation of rustic traders is fantastic."

"Oh, Maras, why must you keep on about your old Empire? It's gone. Why not forget about it?"

For the first time since he had known her, Moree had

said something that annoyed Sellers. He told himself that it was because he was so wound up and was debating his answer, when Samel plodded up to where they were.

"Look, Samel," said Sellers. "We're going away together and we don't want anybody with us, and the hill is too steep for you. Why not go back?"

"I told you—I can't," said Samel, his scanner lenses glowing weirdly and redly in the darkness. Sellers felt Moree tugging at his sleeve and he sensed that she wanted to talk to him alone. He pointed at the black monolith that was a lone tree a hundred yards along the slope. "Wait over there," he ordered.

The little robot had no ingrained objection to a short-term separation from Sellers, so it turned round and stumped off in the required direction.

"You can't leave it behind," Moree said, when Samel was some distance away. "The

men from the ship will find it when they look for you, and it will tell where we went."

"What will we do, then?" Sellers asked, feeling vaguely that something was going horribly wrong. "It definitely can't go with us."

"Then you'll have to break it."

"What?" Sellers said numbly.

"A plough with a broken blade is useless. It's only a machine. Break it with your hole maker."

Alcord was a lazy, peaceful world, where there were no wars or struggles of any kind. Sellers had been impressed when he realised the concept of a weapon was unknown to Moree, that she thought of his Service side-arm as a useful gadget that could drill holes in objects some distance away. It was not comforting to think that her untutored mind had a better grip than his own on the basic problem.

For he knew she was right. He just wished that Samel didn't worry about his spread-

ing rust, and that Samel didn't sing old songs to himself. He also wished that the brutally obvious solution hadn't been suggested by Moree.

"Wait here," he said, feeling the need to act quickly and decisively. He walked towards the red specks of light at the foot of the tree, unholstering his projector as he went. Fifty yards from Samel he activated the force field strung on platinum plugs at the projector's muzzle, which drew the missiles up from the breach. .

Suddenly, there came the sound of Samel's motors whirling into action and the pin-points of light began to bob away into the night to the accompaniment of the thud of metallic feet. Belatedly he remembered that Samel's scanners would work just as well at night and that robotic hearing could be fantastically sharp. Sellers began to run, carrying his projector at the ready, his boots hammering loudly and his ankles stiffened against the slide of loose rock.

He felt a sickness in his stomach when he thought of the risks involved in the blind, headlong pursuit.

This was straight out of a nightmare. "Damn you. You're just a machine," he shouted involuntarily. "Act like one." The ground levelled out below his feet, giving him a better idea of the spatial relationships between the fleeing robot and himself. Sellers squeezed the trigger and sent his first shot screaming off into the night. The slug exploded against a boulder ahead, and slightly to the left, of Samel. In the fleeting brightness he glimpsed the robot's angular silhouette and squeezed off two more shots. The first one fountained earth and the other blossomed flame squarely under Samel's churning legs.

The blast lifted the robot into the air and Sellers thought he glimpsed one of the tubular legs spinning away down the hill. He ran on until he was only twenty yards from the point where the shell had

struck. He stopped and stared until the jagged after-images faded from his vision and he could see that Samel's tell-tale lights were still glowing. Sellers altered the selector for smaller shells and took careful aim.

The robot's voice drained the blood from his face. "Don't shoot me," it said. "Please don't destroy me."

Sellers cursed quietly and steadied the projector on his forearm—it was difficult to see anything at all, and he wanted to finish the robot with one shot.

"Yours wasn't the first universe ship to land here," Samel's voice came again. "There were others. And there were other men that deserted—do you know what they do to men who desert the universe ships? It's the worst of all . . ."

Sellers split Samel open with his first shot and then blazed two more into the twisted, glowing framework. He stood for a time before he turned and walked back to Moree.

When almost at the trees he remembered that he hadn't holstered the projector. Doing so, Sellers wished that he had been able to control the spasmodic twitch of his finger that had cut the robot off in mid sentence. It was probable that other outward bound colony ships had made the last stop on Alcord—planets with ideal climates and ecologies were not too plentiful on the rim. The robot might have had something important to tell him . . . Somewhere, some time in the distant, blurred past there had been something—a dream perhaps—that tied in with Samel's last words.

Do you know what they do to men who desert the universe ships? Had he had a glimpse of this moment rolling towards him down some momentarily revealed path through shifting probabilities? It was too late now, anyway. Samel was dead, if there could be death where there had never been life.

"Let's go," he said when he reached Moree. She nodded

silently, Sellers put an arm around her shoulders and they set off up the hill. When they reached the top, where it levelled out into a plateau for several miles before sloping down into the valley for which they were heading, Sellers had begun to feel a little better. The smooth ground was covered with the short, glistening grass that covered so much of Alcord. It warmed him to feel Moree's easy movement beside him.

"Why so quiet?" he asked after a time.

"Nothing," she said casually. She walked on for a few yards then looked down at the holstered weapon on his belt. "When you showed me the hole maker working it just made little holes—there was no fire and there was no loud noise. It just made little holes."

"Because I didn't want to destroy the tree I was aiming at. There's a setting on the projector that enables you to select different types of missiles."

"Well, why did you not just make small holes in the robot? Why did you have to do *that* to it? I didn't know the . . . thing would do so . . . would burst him open like that."

"It was dark and I had to get him . . . *it*, before it got away. Besides, it was your idea. A broken plough . . . remember?"

"A plough that is only broken can be fixed."

"Look, Moree," Sellers snapped, losing his temper, "a robot of as high a type as Samel is a million times as complex as a plough. Believe me—a couple of small holes through his insides would have destroyed him just as effectively, though perhaps not so quickly.

"Another thing. In spite of that marvellous complexity, Samel was just a machine. A machine that you thought I was foolish to give my gloves for, and which I had a right to smash whenever I wanted."

"Then why did it run away? And why did it beg you not

to destroy it?" Moree was keeping her face straight ahead as she spoke.

"Because the ones who built Samel valued him and wanted him to last as long as possible, and who better to look after Samel but Samel himself? So they put in self-preservation circuits. It's as simple as that."

They walked on across the grassland in the silence. The yellow moon rose higher into the sky, the starless part of which was beginning to give way noticeably to the unhurried ascent of the rest of the universe. Close to the horizon another and smaller rose-coloured moon began to appear, rising out of the faint mist.

Sellers was beginning to forget the incident when Moree spoke again. "If Samel was just a machine why did you feel it important to get it over with quickly?"

"Because he seemed human. That's why I keep referring to Samel as 'he' instead of 'it.'" Sellers stopped sharply

and caught Moree's arm, swinging her round to face him. "You wanted Samel out of the way and I put him out of the way. It was your idea. It's done, so let's forget it." He stared down at her for long seconds and felt a sudden welling of coldness and fear inside him. "Moree," Sellers whispered, "is this what I deserted for?"

"No, Maras," she breathed, and he found her in his arms again. They stood together and stayed close until Sellers found his reassurance once more.

He had taken far too much of the potent dark brown beer, Sellers realised, and there was a distinct possibility that his stomach would rebel against the unusual treatment, but he was not in a mood to care. He glanced across the hearth to where Moree's uncle was sitting gazing quietly into the log fire which was irregularly strewing walls and ceiling with restless light. They would never find him here.

When it was realised that he was not going to appear at the final muster the men from the universe ship would search for him, but they would never think of this tiny village. It was too close, only nine hours on foot to be taken into consideration. They would expect a fugitive to go as far away as possible in his twenty days final leave before the big jump to another galaxy. That gigantic leap into space from which there could be no return.

That was why there were no tabs kept on the men and women of the universe ships on the last planetfall in their home galaxy. Although they were gypsies all, fated by their psychological make-up to travel and keep travelling, it was felt that there should be one last period of complete freedom and relaxation.

Sellers wondered briefly what had gone wrong in his case. Had he been absorbed into the Service at too early an age? Had the long years of training and conditioning, so

expensive for the Service, only served to suppress a latent yearning for a real, solid home? All Sellers knew was that as the stars ahead of the big ship had thinned and disappeared he had grown more and more certain that he could never do it. The psycho team must have slipped up in his case, that was all. Hadn't Samel said that there had been other men from earlier ships?

Do you know what they do to men who desert the universe ships?

Sellers drew his stool closer to the fire.

"Getting nervous?" asked Moree's uncle Mill, smiling a little, the impartial firelight erasing the deep handwriting of time on his brown cheeks. He was a jaunty wisp of a man who had welcomed Sellers and Moree with the sort of welcome that was given everywhere on Alcord, and had taken Sellers aside to drink and talk while Moree was preparing for the wedding.

"No," Sellers replied, "I'm not nervous; at least, not in the sense of being scared."

"What way then?"

"Well . . . in the way a man would feel on his wedding night," explained Sellers inanely. He knew it was the effect of the potent drink, but he found himself with a distinct impression that he had said something very funny. He struggled for a minute to prevent himself from giggling and got into a cold panic when he realised that he was losing the struggle. Before Uncle Mill would notice anything he rose to his feet, took a quick turn round the room and stood looking out at the false dawn through the tiny panes in the door.

Dawn! This was the last day that his ship would have on this, the last planet in the universe. Then it would be flung out because men wanted to take their kind round the full curve of the universe and own it. The night was cool and fresh when he opened the door and stepped outside.

"I need some air," Sellers called over his shoulder.

"Well," the uncle answered from within, "you'll have time for walking before Moree comes down. Anyway, if you *are* late we can wait. I won't be going anywhere."

For a minute Sellers wondered what the other meant, then he remembered the nature of the marriage service on Alcord. Any married couple had the power to perform the wedding ceremony by writing a few words on a paper and signing it. Divorces could be arranged the same way. Easy come, easy go, whereas in the Hub worlds the ever-tightening social laws were making it harder and harder even to live without offending some code or conscience.

That was progress. Man's climb from the blameless, sinless life of the savage towards a far distant goal of universal asceticism—and Sellers was sick of it. He had never had any patience for the moralists of the Hub stars, who were constantly patting

themselves and their age on the back for the profusion of their neuroses. Boasting that the restless nagging voice of self-reproach was Man's fine and laudable companion, and guide to the philosopher's dream of ultimate man.

Perhaps it was the fact that the universe ship had been carrying a segment of that culture with it that had overthrown Sellers' urge to travel, and made him so sure that he had to put down roots on Alcord. He glanced up at the now fading galaxy. Once the ship left the home universe there could be no hope of ever finding another hiding place like this one.

"I think I *will* take that walk—why is Moree taking such a long time?" Sellers asked.

"I don't know," shouted Mill, and Sellers heard him poking at the ashes in the fireplace. "Those aunts of hers are a lot of old hens. Instead of learning from experience they only discover more ways to go wrong. They

were much quicker with the washing and dressing at Moree's first two."

Something icy cold and sickening made a swift convulsive movement in Seller's stomach. Checking the sudden upward movement of liquid inside him, he forced himself to remain motionless. "Her first two . . . marriages?" he asked.

"That's right," came the answer. "Moree is a fine looking girl you know. It's a wonder more of the young men didn't try out married life with her. Maybe they asked and were turned down."

Sellers gripped the leather-lined door jamb hard. What did you expect, he asked himself. What were you looking for? This is Moree's world and she has lived according to its ways. This was merely proof that this was the sort of place he had always wanted. Nothing has changed, he told himself.

"I'm taking that walk," he told Moree's uncle. He left

the house and struck off along the path away from the silent village, every other house of which was in complete darkness. Fifty yards along the way he stumbled against an upended wooden cart and fell across it. He lay in the darkness for a minute tightening his lips against the throbs of pain from his side where a projecting bar had thudded into him. From the lighted windows behind him there came a peal of woman's laughter, faint and strange on the quiet air.

The real sickness hit him then. When the paroxysms of retching were over, Sellers found himself weak and swearing, lying on his side, in the dewy grass. His hands were throbbing with pain and warmly moist and he realised that he had been hitting at something. Consciousness came and went several times in a few minutes, huge objects seemed to approach him and recede to the other side of infinity and then rush back again—a sensation of nausea

he had not had since childhood sicknesses. Once or twice there seemed to be lights and movement and people talking.

Do you know what they do to men who desert the universe ships?

The memory of Samel's monotone was so real that, for a moment, Sellers thought the robot was beside him, then he remembered what he had done to Samel. The sentence triggered something in his mind, and tears flooded into his eyes as the vision of childhood that had flickered once before, flashed into his mind. "I know! I know!" he shouted. The recaptured moment was gone again and he no longer even had a vestige of a memory of it, but he *knew*. He knew what they would do to him. He fought to his feet against waves of weakness and vertigo and began to run.

Aboard the universe ship they were gypsies all. Every man had been selected for the wanderlust that flamed in him,

and the money and time that had been poured into his training and conditioning had fed that flame.

Sellers was a product of *his* world, and, although he often hated himself and his environment, it was his life and there was nothing he could do about it. A man is the sum total of his years, and Sellers' had been years of full, free flight, and his ways were not the ways of this world. There *was* a horrible punishment, the ultimate nemesis, self-inflicted, awaiting the man who deserted a universe ship.

It would blast off and leave him.

The ship would leave in the evening. It was a long way off and Sellers was sick and exhausted. The journey would be the hardest, most gruelling trial of his life, but Sellers reckoned that he had a good chance of reaching his ship in time to go with it.

In a minute the lights and sounds of the house were lost behind him and Sellers was in full, free flight again.

High in the sky, for a brief second,
there was—

A STAR CALLED TOMMY

by ROBERT PRESSLIE

MY KID BROTHER, TOMMY, invented anti-gravity when he was seven. Maybe he didn't exactly invent it then, but that was when his dream began.

I guess every kid spends more time playing in the bath than he does washing himself and Tommy was no exception. When he went upstairs to the bathroom, the rest of the family knew that was the last they would see of him for at least an hour; and when he finally reappeared, he just grinned at us, kissed the old folks goodnight and went off to bed without any explanation for the time he had wasted.

Of course, I knew. Being five years Tommy's senior, I

was allowed to stay up an hour longer. But when I went to our bedroom, Tommy would still be awake. He would be lying on his back, staring at the ceiling, with a piece of cork clenched tightly in his hand. That cork was the symbol of Tommy's dream. Tommy's game in the bathroom consisted of holding the cork on the bottom of the bath—and then letting go. He never ceased to be amazed when the cork shot to the surface of the water.

"Did it go up again tonight?" I would whisper from my pillow, ribbing him gently.

"Yes, Jeff," he would answer seriously. "It does it every time."

He was old enough then to

understand that gravity made things fall to the floor and the behaviour of the cork in rising upwards was an apparent contradiction of natural laws. Sometimes I tried to impart some of my superior learning and explained about density and specific gravity. But Tommy could always counter my arguments.

"If I had a tube of water as big as from here to the moon," he once said, "I could send a cork all the way up there."

"Sure you could," I replied, "but that's impossible. The glass would break if it was that size."

"Maybe something else, then."

"What?"

"A spaceship."

"In a glass of water? Go to sleep."

"But, Jeff, you said the cork rises because the water is heavier——"

"Denser."

"All right, denser. Well, a spaceship could go up to the

stars if you could put something denser round it."

"That's old hat. Airships were built on that principle, only they were lighter than the air round them. Anyhow, the air doesn't go right up to the stars."

Tommy had an answer of sorts. He talked vaguely of a ship that sent out a forward jet—as opposed to the rockets that were being tried out in Australia and elsewhere. This forward jet of Tommy's would send out a stream of material heavier than the ship so that the ship would rise up through it. Like a cork in water.

By the time he left school, he realised that most of his notions were highly impossible, even ludicrous. Yet he never threw away that piece of cork. As he grew up and changed into ever larger suits, the cork was always carefully transferred to the safest pocket. Even when the suit became a uniform, the cork went where Tommy went.

At seven he had said: "Some day, Jeff, I'll puzzle it

out. Then I'll make something to go up and up and up. Right up to Heaven, maybe."

At seventeen he went up—into the Hell of rocket-plane warfare.

He came through that short-lived affair in one piece, although his boyhood was left somewhere in the ruptured skies. His smile, which had once been so ready and infectious, was tighter and not so frequently in evidence. And he seldom talked of his anti-gravity dream; he couldn't believe that space travel would ever be used solely for peaceful purposes.

Five years later, when the first radar-controlled ship circled the moon, he applied for a job at the spacefield.

I think they must have been waiting for Tommy. They took one look at his flying record, checked his physical and mental health and signed him on to take up the first manned ship.

From the moment his name was made public he was a hero. Girls mobbed him in the

streets—until he was forced to travel everywhere in a private helicab. News hawks spewed ink on every detail of his young life, inventing what they could not ferret out from myself and Tommy's friends. Those weeks preparatory to the great take-off were nerve-racking for everyone close to Tommy; weeks of dodging reporters, rubbernecks and nosey-parkers; weeks of living without privacy, of having security escorts breathing down our necks everywhere we went—literally everywhere. Tommy had so much to learn about the ship itself that he was the least affected by the tension and excitement.

He came to see me the night before take-off. I never saw him looking fitter or so full of anticipation and determination.

"Is this going to be it?" I asked him.

He knew what I meant.

"Not quite, Jeff, but it will do till the real thing comes along," he said, and fingered an old piece of cork.

The next five days belonged to Tommy alone. There could have been a plague in Egypt, an earthquake in Japan, a volcanic eruption in Italy, there could have been a dozen major catastrophes and none of them would have stolen a line on the front page of a newspaper or a phrase in a newscast.

Those five days were a world holiday. Work was abandoned while everyone counted the thousands of miles Tommy had traversed, speculated on his chances of ever returning safely.

Then came Tommy's brief radio message from the surface of the moon.

At that hour he could have asked for any favour he pleased and would have been granted it. He was the hero of all heroes. Newborn babies were named after him, lucrative sinecures were offered by the hundred, and the Prime Minister proposed and made the first donation to a fund in his honour.

Thirty-six hours later,

Tommy's name was a curse in the public mouth.

The flight to the moon had been a success. A historic landing had been made. The ship had taken off again on schedule, set on a homing course for Earth. A new era had been entered upon.

Then came Tommy's second message to the world.

The jubilation and congratulations had been too premature. With the ship heading towards Earth the atomic motors had suddenly failed. A fortune in scientific ingenuity had become a useless mass of metal. And the mass of metal was hurtling, uncontrolled, to bury itself somewhere in the Earth from which it had so recently soared.

What made everyone quake and curse was the uncertainty of where the ship would crash and the certainty that it must. Under Tommy's control it should have landed on the field it had left from. With the motors out of action it could

land anywhere. New calculations were made to discover which part of the spinning globe would be under the ship when the moment of collision came. There were too many unknown factors to enable a precise calculation to be made.

The scientists got their word in first. They had designed and built a ship to perfection. Nothing could go wrong. Something had—then blame the human factor. Blame the pilot.

The doctors and psychiatrists scratched each others' backs and denied that any flaw in Tommy's health had been overlooked. If the failure of the flight was due to the human factor, they insisted that Tommy must have changed after he had been examined.

In other words, he had been got at.

The security boys took over from there. That's how I found myself in the Ops room at the spacefield. I had pleaded earlier to be allowed to watch

the radar track of Tommy's flight, but my qualification of being the pilot's only relative was not enough. Now I was bang in the centre of the picture, along with everybody else who had ever as much as nodded to Tommy.

It took four hours to whittle the number of "suspects" down to a dozen, and another four hours to convince the security boys that none of us so much as leaned towards the red end of the political spectrum. All of which time left me tired and alone in the Ops room apart from the military and the boffins.

Tired as I was, I didn't accept the offer to go home and sleep and forget I had ever been there. And they hadn't the heart to toss me out of the Ops room now that I was there.

They gave me some of the tablets they were fuelling themselves with and a front seat at the radar screen.

Somehow, I couldn't connect the pale blip on the dark screen with Tommy. It could

have been a stray comet, a fly on the antenna or a flaw in the glass. But it wasn't Tommy. Tommy was a kid with a dream and a man with a pathological hatred of war.

"He's an incompetent fool and a treacherous killer," said somebody, with fantastic timing.

I've still got the marks of his teeth on my knuckles.

It was the security chief, Webber, who unwound my fingers from a gurgling throat and guided me back to my chair. It was Webber, too, who stilled the growl of angry voices and made the others let me remain where I was.

"He's my brother," I told Webber, by way of superfluous explanation and implied thanks. "I know he isn't crashing the ship deliberately. He's not like that."

Webber pulled a chair close to mine and sat down. "Tell me what he is like, then," he said.

I told him all I knew. Webber teased the memories out smooth and easy. It

wasn't like reeling off a list of Tommy's likes and dislikes, his phobias and fanaticisms. With Webber prompting cleverly, I simply laid out Tommy's life in words, in stories of remembered incidents—the funny ones and the sad ones, the ones that stuck sharply in my mind and the ones I was surprised to recall.

I even told him about the cork.

Webber rose and brought over a bundle of clothes. On top of the bundle was a little pile of assorted items: a pen, two pencil stubs, a cigarette case, a few other odds and ends. And a piece of grubby cork, with smooth, time-rounded edges.

"This it?" asked Webber, handing me the cork.

"Why are his things here?" I countered. "Is he up there naked?"

"Damned near," said Webber. "Payload," he added and I understood.

"Even a little bit of cork," I mused in wonder. "A bit of

cork that couldn't weigh more than a gramme."

Somebody shouted: "He's got it going! In the past minute he's moved point five seconds off his previous line of flight. Ask how he did it. Get him to speak."

I was pushed off my seat before I had time to notice any change in the blip's position. Everyone wanted to see what was happening.

"He still won't answer, chief. Maybe he hasn't fixed it. Maybe the ship just blew apart."

"It wouldn't track."

"It might, for a few seconds."

"A few seconds have passed."

"Well, if it hasn't blown apart, maybe the atomics have run wild. If he was alive, he'd speak, wouldn't he?"

Webber's hand gripped the knotted muscle in my forearm. "Easy, boy," he said. "He's not their brother, you know."

That's right, I thought. He's

my brother. I grabbed a mike from somebody's hand.

"Tommy," I said. "Tommy, this is Jeff speaking. How's it going up there?" I picked my words carefully. "Listen, Tommy, if you're too busy, if you're working to get the motors going again and you haven't time to speak, don't bother. But if you know that nothing more can be done, talk to me. Are you hurt?"

His voice wavered in its journey through space. "Hello, Jeff! No, I'm not injured. In fact, there hasn't been any accident. The motors simply ceased to function and they won't start again."

"I've been watching the stars," he added.

As if pulled by strings, everybody surged nearer the loudspeaker above the radar screen. I could almost hear their thoughts—A spaceship that had cost a national fortune was lancing its way to destruction and the pilot was watching the stars.

"Shut up!" I shouted, before they could speak. And to

Tommy: "Not you, kid," I added. "What happened just now to make your radar track weave? We thought you had righted the fault."

"I don't know," said my brother. "I've been gunning the motors intermittently and there was a brief response. But they died again. You should be out here, Jeff, to really see the stars. Hey, hear me! So near the infinite and splitting infinitives!"

The others must have thought the strain had caught up with him. I knew better. Only an irretrievable situation could have made Tommy joke like that.

"It's the end?" I said, and although he didn't say "Yes," I could sense his slow, affirmative nod. Blood ties reached across space and we were in complete communion, without the aid of puny words or punier electronics. For a full minute we were together, then the mike was taken from my nerveless grasp.

"Mason," a voice gritted from a chestful of ribbons,

"I don't know who you're working for, or what you're trying to prove. I do know that you're in a ship that belongs to this country and I suspect you're deliberately flying it to a pile-up. Now I'll tell you something you don't know. That ship is a prototype. Successive models will be used to set up a moonbase from which we can pinpoint any enemy target in the event of war. Others will be used for attacking manœuvres. In an eccentric orbit they will possess the evasiveness and surprise value of a thousand fighter planes and the striking power of a thousand bombers. But we must have that prototype back in one piece for the value of the data which the instruments have recorded. If you have a shred of patriotism left in your blood, bring that ship down here."

Tommy let them all sweat until morning before he answered. Nobody slept. Nobody could have for the babble of angry voices. Tommy was taken apart limb from limb,

phrase by phrase, cell from cell, swear-word by swear-word.

And I let them talk the anger out of their spleens. I knew that Tommy would give them the whole lot back—and more. Which he did.

Through all the tirade he launched, I could detect the hurt in his heart. Sure, he hated the idea that he had been given the job of testing a potential war weapon; but he loathed the fact that he had been deceived into doing it. He had specifically asked if the ship was even remotely considered for military purposes, and he had been satisfied with the denials.

He was good that morning, Tommy was. Given a soap-box in Hyde Park, he would have converted the nation to pacifism. As it was, he convinced everyone in the Ops room that the ship was, indeed, doomed, that he had nothing to do with the failure of the motors and that there was nothing he could do to better the situation.

There was utter silence when he had finished speaking, one of those silences that make you flush in secret guilt. And I saw a good many red faces.

I also saw a parchment-white one.

A little, bespectacled man—a man who looked like a government pen-pusher, but who was actually a computer expert—was pushing his way into the group of brass. There was a slip of paper in his trembling fingers.

The paper was passed from hand to hand, and as it passed, its message left each reader's face restored to barrack pallor. When it was Webber's turn to pass the paper to me, he handed me the mike at the same time.

I read, looked at the blip on the radar screen, hesitated and decided to tell Tommy, all in the space of a breath-held moment.

I flipped the mike switch. "Me again—Jeff. I'm not sure if I should tell you this, Tommy, but I will, just in

case there's anything, any slightest thing you can do."

I must have paused because Tommy's voice urged: "Go on!"

"You're getting close to Earth now, close to home. Close enough for some exact calculations to be made."

"Well?"

"They know where the ship will crash. You can guess what the atomics will do when that happens."

"I'm not worried about that, Jeff. I'm ready."

"Forgive me, kid. I know you're ready, but there are thousands who aren't. The ship—the ship's going to hit London. More than that can't be predicted. But somewhere in London is certain. There isn't time for a full-scale evacuation. To attempt it would cause panic. If the exact location could be predicted, that area could be cleared, but the exact location is uncertain. Is there anything you can do, Tommy? Can't you get even a little kick from

the motors, just enough to bring you over the sea?"

Tommy took too long to reply.

"Get off your backside!" I shouted, glaring at the blip. "If you couldn't save the ship before because of your principles, save it now. It's still a weapon! There are women down here, and kids. They're getting out of bed, ready to start a new day. And they don't even know it's maybe their last. Don't sit there doing nothing, Tommy. Do something! Do anything!"

The blip was swimming from side to side across the radar screen. I cleared my eyes with the back of my hand and wiped the wet against my coat. "I'm sorry," I whispered. "I'm sorry, kid."

Tommy answered, quietly and gently. "Jeff," he said, "you're a good guy. I think I *can* do something. Remember how I used to dream about anti-gravity? Now's my chance to test a little theory of mine."

Every eye in the Ops room

turned towards me. I shrugged my shoulders.

Tommy continued: "I think maybe I can fix the atomics so that the ship will stop falling. I'm going in there now to see if I can make her go up and up and up."

I came to life. "You can't do that." I screamed. "The radiation!"

"The women and kids!" he quipped back.

"Tommy!"

"Keep your eyes on the radar. You'll know if I've succeeded. Going in now. See you sometime, Jeff."

Then, and only then, did the pale blip become Tommy. The Ops room was still as a morgue, and for me there was no one there but my brother and myself. The blip was small but I could see the long maze of machinery among which Tommy was crawling. As he got nearer the atomic reactor, my skin prickled in sympathy with his. But with me it was only sweat.

The seconds dragged and I couldn't stand the suspense. I got away from the screen and opened the door. Nobody stopped me. It was impossible, of course, to see anything in the slate-grey sky, yet I reached up into it with every fibre of my body.

There came a sigh from through the open door, a sigh of released breaths.

By some fey intuition I turned my head to the east where the sky was darkest and for a moment I saw a new star twinkle.

A star called Tommy.

Something was making my clenched hand hurt. I looked and saw an old piece of cork. And I remembered a little boy of seven vowing that one day he would go up and up, maybe right up to Heaven.

I couldn't help thinking: maybe he did, at that.

Long afterwards, when I turned to pick up Tommy's things from the Ops room, I heard a rumble as of distant thunder.

They weren't very different
even if they were—

Spaceborn

by JACK LEWIS

FIFTEEN MILLION MILES from touchdown, Skipper Manus pulled the pins out of the pile. There was a faint lessening of vibration—nothing more. Most of the ship's ninety-four occupants were unaware that they were already on deceleration.

At the communications table, Axtel Shear had a beam-fix on the green planet. He was a big raw-boned man with high cheekbones and a thick, rasping voice that droned on with machine-like monotony:

"Star Quest to Terra . . . Star Quest to Terra . . . Come in Terra!"

From the bucket seat at the control panel, Skipper Manus watched anxiously. Any moment now someone at the

Pana Spaceport would acknowledge and wires all over the Earth would begin buzzing.

Five minutes went by . . . Ten.

Axtel Shear slammed the speaker against the backboard.

"They don't answer," he said.

The skipper walked over to where he sat. "They have to answer. Keep trying!"

The communications man raised his eyes. "Shall I go out and shout at them?" he inquired coldly.

The skipper's watery-blue eyes remained impassive. He was a wry-looking man, with a shock of unmanageable hair that had been white before the voyage started.

"Keep trying," he repeated quietly.

In another section of the ship a youth sat reading a book. He was a sensitive-looking boy in his late teens. From time to time he'd look up from the book and stare into the star-studded blackness outside the porthole. Finally, he put the book down and pressed his face against the glass.

The view had changed. Alpha Centauri, once close-by and white hot, no longer boiled into the starboard ports. It was only a star now—remote and infinitesimal. And cradled in the depths of Sagittarius like a marble-sized emerald in a sea of lampblack was the Earth.

And the youth gazed fixedly at the green planet and wondered what it held in store for him.

"Jus?"

The boy turned at the sound of his name. The girl at his elbow wore no make-up, yet her face had a fresh glow of natural colour. She just missed being on the plump side. It was the way she

missed it that drew lingering glances from every male on the ship, despite the fact she'd just turned seventeen.

"Any news, Jus?" the girl asked.

The boy shook his head. "No, Alda, no news. They'll announce it on the speakers when we make contact."

The girl sat down beside him. For a full minute she stared at the silent squawk-box bracketed against the metal hull. Then she leaned back, her long dark hair trailing behind the foam cushion seat-back.

"What's it like, Jus?" she said, without taking her eyes from the ceiling. "What's it really like?"

Jus turned. For several heartbeats he allowed his eyes to caress the warm curves of the girl's profile. "It's crowded, Alda," he said finally. "Every book and tape I've ever read says there's not nearly enough land to support everyone."

The girl folded her hands in her lap. "Five-billion people," she said softly. "Just thinking

about all those people scares me."

"It shouldn't, Alda. They're just people—just the same as you and I."

"But I don't *know* them, Jus! These people on the ship I *know*. But not *them*!"

Jus dropped his eyes. An impulse to comfort the girl churned up inside him, yet her very closeness filled him with a strange uneasiness.

"It won't be so bad, Alda," he said thickly. "The Elders say we'll be heros when we arrive. They say there'll be video broadcasts and newspaper interviews. They say people from all over the world will be interested in who we are and where we've been."

He could feel Alda's eyes on him. He didn't look up.

"But why? Why, Jus?" he heard her say. "We didn't even land on the planets of Centauri. They were just as dead as those in our own system. All *we've* seen is space. You and I were born in space!"

"The Elders say that doesn't matter, Alda. They say the important thing is that we tried—that we were the first human beings to reach a *star*."

"They told you that?"

The boy shook his head. "They didn't tell me exactly, but I heard some of them talking about it. They said the people on Earth would be especially interested in us."

"In *us*?"

"Yes, Alda. That's what they said. They said people on Earth would be interested in us because we were space-born."

"Does that make us different?"

Jus stared at the palms of his hands. "There was an article in the ship's bulletin," he said. "It wasn't just about us. It was about all the space-born—all thirty-two of us. But I got the idea that it was mostly about the older ones—the ones like you and me."

"What about you and me, Jus?"

"Well, according to this

article, we're supposed to have some sort of complex—a space complex they called it. It seems that normal children mature to an extent by imitating the actions of children in an older age group. Only with us there isn't any other age group. There's just us and the Elders, so we've been forced to duplicate *their* personality. Furthermore, because of our restricted environment, we've been regimentated into the same way of living as theirs . . . They say that isn't good for children. They say children should be given an opportunity to make decisions of their own."

"Was that all it said, Jus?"

"No. It said that because of these factors we were fifty years old in our actions but only eight years old in our ability to reason things out for ourselves. It said we'd find everyday living almost unbearable when we got back to Earth."

The girl sighed heavily.

"So we *are* different then—we really *are* different."

Jus looked out the port again. "The Elders say we are," he said. "And I guess they ought to know."

Skipper Manus' sandals clicked a monotonous cadence against the floor while the toneless chant of Axtel Shear continued to ring in his ears.

"*Star Quest* to Terra . . . *Star Quest* to Terra . . . Come in Terra!"

When the skipper stopped pacing, Shear dropped the speaker unit from his lips. "What now?" he asked.

Skipper Manus ran a hand through his white hair. "I can't understand it," he said. "Why don't they answer?"

"Shall I keep trying?"

Manus shook his head. "No. Try them again later. Could be they've changed the wavelength. Maybe that's why we can't contact them."

Shear grinned around a set of yellow teeth. "Maybe they don't want to answer," he

said. "Maybe they don't give a damn whether we come back or not."

"Why should they feel that way?" Manus demanded.

The communications man turned up the palms of his hands. "A lot can happen in twenty-one years," he said blandly. "Maybe they've outlawed space travel. There was some talk of that right after we learned that none of our own planets could support life."

Skipper Manus clenched his fists. "Impossible!" he said flatly.

"Is it?" Shear asked.

"Certainly it is! You're forgetting that the men and women aboard this ship represent the best brains in the world. We were chosen for the mission because we're scientists. The trip schedule worked out to twenty-one years—give or take a few months . . . Now the twenty-one years are up. They're expecting us back!"

"So why don't they answer, then?"

The skipper's voice became calm. "I can't answer that," he said evenly. "Not right now I can't. But there's a reason for it—a good reason. I'd bet on that."

The thin rasp of a buzzer rippled across the control room.

The skipper glanced at his watch and nodded at the communications man. "Take over," he said, and disappeared into the corridor that led to the ship's dining room.

Jus stiffened at the sound of the skipper's footsteps. Then he glanced sharply at the girl and got up.

Skipper Manus nodded at him in passing. He did not speak.

"Is there—is there any news, sir?" Jus called after him.

The skipper's stride slackened, then quickly returned to normal as he made for the dining room bulkhead.

Jus ran after him. The old man's frosty hair barely

reached his shoulder as he fell in step beside him.

"We've been waiting for the announcement, sir," the boy said breathlessly. "We've been wondering if you made contact yet."

Skipper Manus stopped, measuring the boy with detached amusement. "Is that all that's worrying you, lad?" he asked mildly.

Jus avoided the watery-blue eyes. "Yes, sir."

The skipper patted his arm. "Don't let it worry you, Jus. Everything's going according to plan. Don't forget, boy, the best brains in the world are right aboard this ship and as soon as we hear anything we'll announce it over the speakers."

"Yes, sir." The boy turned and started to leave.

"Jus?"

The boy stopped.

The skipper's lips were set in a quiet smile. For a long while he regarded Jus fixedly—as if seeing him for the first time.

"How old are you now, lad?" he asked suddenly.

"Nineteen, sir."

The old man shook his head. "Incredible," he said. "It seems like just yesterday that you were born. Did you know, lad, that you were the first baby ever to be born in space?"

"Yes, sir. I know."

Skipper Manus sighed wearily. "It's so hard to realise you've grown up, lad. Already you're a full grown man. And before long you'll have to assume a man's responsibilities."

"Yes. I know, sir."

"Too bad I didn't realise you'd grown up sooner," the skipper said thoughtfully. "Perhaps I could have assigned you to some minor job—something you'd be qualified for."

"I'd have liked that, sir."

"You would?"

"Yes, sir. Ever since my father died I've been wanting to do something—something to replace him, sort of."

There was an awkward

silence. Then Skipper Manus said: "The trouble is, lad, placing you would present sort of a problem. You see the men and women here are all specialists. We're a combination, so to speak—a combination of the best brains in the world."

Jus nodded. "I know," he said.

He watched the skipper till he disappeared into the dining room. Then he went back to where Alda was waiting for him. "There's nothing to worry about, Alda," he told her. "The skipper says everything's going according to plan."

The girl nodded, her blue-grey eyes regarding him solemnly. The room was empty now. The noisy youngsters who were playing farmer in the centre of the floor had left, and they were alone.

Absently, Jus picked up the book he'd been reading, tried to concentrate, but the letters kept jumping out of focus and blurring into a jumble of meaningless phrases.

He put the book down.

"Alda," He tried to make his voice casual. "What will you do—after we get back, I mean?"

The girl moved her shoulders. "I don't know, Jus. I'll go to school, I guess. Now that we're twenty-one years behind the world, the Elders say we'll all have to spend some time on education . . . even them."

"Is that what you want to do, Alda? Is that what you really want?"

He watched the girl bite her lip.

"It's a terrible thing to say, Jus," she said suddenly. "I know it's terrible to even think about it, but sometimes I find myself wishing that while we were gone something happened to the Earth—something that destroyed all the people but left the planet fresh and new so all we'd have to do was to land and start all over again . . . Do you ever feel that way?"

A lump that started in the boy's chest rose to his throat.

Around it, he said: "I've been thinking, Alda. I thought maybe I could get a piece of land somewhere. I'd like to work the land—make things grow . . . I thought maybe you . . ."

"But you couldn't, Jus. That's just it, you couldn't. Land is scarce! The government won't release a plot till you've passed agricultural tests. Don't you see, Jus, you don't know anything about farming? Neither do I. We don't know anything about anything—except space!"

"I'll do something else then," Jus said fiercely. "They won't lick me. I won't let them! I don't care if there *are* five billion people out there!"

Alda was regarding him quizzically. She didn't smile. The only trace of humour was a slight twitching in the dimples of her cheeks. "So it's not only me, then," she said quietly. "You're afraid, too."

"I'm not afraid."

"But you are, Jus. You just said——"

"Afraid isn't the word, Alda. It's a different kind of feeling—the kind of feeling you get when you don't quite know what to expect. Ever since we can remember the Elders have been telling us about Earth; about how big it is; about how many people live there; and about how a sunset looks over a body of water so big you can't even see across it.

"I've listened to them, Alda. And I've thought about it. Lots of times I've wondered what it would be like to walk in one direction till you couldn't walk another step and keep seeing new things, and new faces—strange faces."

"I've asked the Elders what it's like lots of times," Alda said suddenly.

"So have I, Alda. And each time I ask, I get a different answer. Sometimes they talk about flowers that grow in the fields and sometimes they talk about houses with curtains in the windows. But the

things they talk about are *small* things. None of them have ever made an effort to give me a complete picture of the Earth."

Alda looked thoughtful. "That's what happens when I ask, too, Jus. It's strange that they can't describe it. You'd think describing the place where they've spent most of their lives would be easy for people who have the best brains in the world."

For a long moment Jus stared out the port. Abruptly he turned, his eyes smouldering. "You know what I think?" he said suddenly. "I don't think the Elders *have* the best brains in the world!"

"Jus! You shouldn't talk that way."

"Why not?" Jus said defiantly. "Each time I think about everything they have on Earth and the people who made those things possible I find myself comparing them with the people who are operating *this tiny ship*. All our lives these people have been telling us that they

represent the best brains in the world. And we listen to them and we believe them! What else can we do?"

"Each time we have an original thought, we're reminded that we're wrong. We *have* to be wrong. Because if we weren't the best brains in the world would have already thought of it. And yet all this time these people who claim to be so intelligent seem to be totally unaware of the fact that we've been growing up—that we've been developing brains of our own."

"You know what I think, Alda? I don't think we're different from people on Earth at all. I think this 'space-complex' is just a word the Elders invented to cover up their own shortcomings. Oh, we have a complex all right. But it's not a space complex. It's a plain, ordinary inferiority complex which we've acquired by letting them bully us into believing that simply because we've never been off this ship, we're not as good as someone who has!"

"Don't you think I've wished we could go back to find that all the people were gone? Don't you think I'd enjoy having the place all to ourselves? But that's wrong, Alda! It's the wrong kind of thinking!"

Jus stopped, panting, as if he'd just completed a double exercise stint. The girl was staring at him earnestly. Her face was very close.

Abruptly then, the staccato crackle of the squawk-box rang through the ship.

"Attention . . . Attention . . . Radio contact with Terra has just been established!"

The *Star Quest* settled on a mile-square metal apron nestled between tall symmetrical buildings of pastel colours. Through the port-hole, Jus and Alda watched a land car towing a portable runway move out to meet the ship. There was a hissing noise as the locks opened followed by a bustle of activity. Then the occupants began to file out of the ship.

Among the last to emerge into the bright June sunshine were Jus and Alda. For just a moment they stood at the top of the ramp staring at the boundless horizon and the strange but friendly-looking man in a blue uniform who nodded courteously as he helped the Elders off the bottom step of the ramp.

The man in uniform smiled as they moved past him. And that was all. There was no cheering crowd; no video cameras to record their every move. Just the man in the blue uniform.

A hundred feet from the ship, the Elders were huddled in a tight, bewildered group. Jus and Alda didn't join the group. Instead, they stood at the base of the ramp next to the smiling man in the blue uniform, drinking in long gulps of air and staring at the pastel coloured buildings silhouetted against the strange, blue canopy.

Then Skipper Manus detached himself from the group and joined the man in blue.

He stood before him, his thin, shaking hand extended in greeting.

The stranger took the hand limply. "You are the captain of this ship?" he asked crisply.

"I am Noel Manus!" The old man spoke haughtily, but he looked small and puny alongside the man in the handsome uniform. "This is all very strange. We—we expected someone to be here—someone to meet us . . ."

The man in blue smiled apologetically. "I'm sorry, captain. We'd have liked to have someone out to meet you but you took us on such short notice. The truth of the matter is, we simply didn't expect you. We'd—well, we'd just about given you up for lost."

"For lost!"

The man in uniform nodded. "Don't think we didn't look for you, Captain Manus. For years we've been looking for you—ever since the first star-drive was installed and ships began to move out of the system. But——" He turned

up the palms of his hands. "——I guess even with a star drive space is big enough for a man to get lost in."

The skipper raised an eyebrow. "A star drive, you say? You mean a ship that travels faster than light?"

The man in blue laughed awkwardly. "I'm sorry. I keep forgetting you've been out of touch. Yes, captain. It was only about a year after you left that the FTL drive was discovered, and we first made contact with the planets of Sirius."

Skipper Manus nodded dully. "I see," he murmured.

"And that's not all," the man in uniform asserted. "From Sirius we went out—all the way out! Out to Procyon, Cygni and Orion . . . And today——" the stranger glanced at his watch. "Just about now, in fact, Paul Harrigan has accomplished the greatest milestone of them all!"

"Paul Harrigan?" Skipper Manus looked bewildered. "I don't understand."

"Oh . . . Of course not. I keep forgetting." The man in blue shook his head. "Actually, captain, Paul Harrigan's arrival at the Chicago Spaceport is probably the reason there aren't any newsmen down here to welcome *your* ship. I expect just about every newsman in the Galaxy is in Chicago covering the Harrigan landing."

Skipper Manus wet his lips. "The Harrigan . . . landing?"

The other man nodded with enthusiasm. "That's right . . . Paul Harrigan; the first man to travel to another Galaxy. And he's due back at the Chicago Spaceport right about now!"

Skipper Manus turned and began walking away. The attendant's voice followed him: "We'll have to move this ship, captain . . . There's a liner due in from Cygni in less than an hour!"

The skipper didn't answer.

Jus watched him until he reached the group of people

huddled in the shadow of the rudder stanchion. Something akin to pity churned up inside him. Abruptly, he was aware of the warm pressure of Alda's fingers in his grasp. He looked at the girl; watched her jerk her head just once in a tight, little nod.

Together, they began walking toward the fence that bordered the spaceport. They passed through the gate and looked back. The Elders, scarcely larger than far-off stars, were watching a giant crane fasten its talons around the nose of the ship.

Ahead of them a long hill rose toward a group of pastel-coloured buildings. Hand in hand they climbed the hill, smiling at passers-by, who smiled back at them. When they reached the top they stopped and smiled at each other. And a ripple of mild breeze streamed through the girl's hair. And the sun felt warm on the boy's back.

And the buildings of the city glistened in the morning sunlight.

He'd never have thought of the idea if it hadn't been for—

THAT ZAMBONI

by E. C. TUBB

IF ANYONE EVER INVENTS A time machine I'm going to be his first customer. I want to go right back into the past and twist the head off the shoulders of a character named Zamboni. I think that was his name, or maybe it was Marchoni, or Volta, or someone like that. Anyway, the man I want is the one who first discovered that if you put a couple of different metals together you can get an electric current.

I hate him.

Why? Well, when I think of what he did to a very close friend of mine I'd grit my teeth if they were my own and not so expensive to replace. Dusty Dribble is the man, a nice, kind, lovable character without a base thought in his head. A man who does his best to make his

way in a society which is dead set against him.

That's right. Me.

It began when I stepped off the ship right into the middle of a bunch of Lunatics. That's what the people who live on the Moon are called, not, incidentally, the name which they call themselves. They've dreamed up a fancy name, Selenites, and it doesn't do to forget it if you want to remain healthy.

I landed with a suitcase, a passport and a cold sweat. The sweat was unnecessary, no one was waiting for me, and I calmed down as the immigration officer checked me through.

"Business?"

"On vacation," I said quickly. "For reasons of my health." I wasn't lying, either. If I hadn't left Earth when I

did the chances are that I would have been escorted off. The destination would have been the same, but the reception would have been very, very different.

"You've come to the right place, Mr. Dribble," said the immigration officer sympathetically. "Your health is certain to improve here." He handed me a stack of pamphlets. "As this is your first visit you'd better read these. Have a good time."

I intended to.

You know the Moon, of course? Everything is in bubbles or underground, sealed against the vacuum and made of metal and plastic. They have quite a community up there, men and women and children, all living in a sort of glorified beehive. Not that they are primitive in any way, they have all the comforts of modern civilisation together with its technology and, in effect, they are a segment of Earth transplanted to the satellite.

I set myself up in an eight by ten box which they called a room and took stock of

the situation. Things are expensive on the Moon, you can't even breathe without paying for the privilege. and I'd travelled light in more ways than one.

It was time for me to get to work.

First, I looked over the market to see what the prospects were, and it was then I got my first shock. There just didn't seem to be anyone making demonstrable stuff on the Moon at all. Plenty of other artifacts, but nothing which I could buy for a credit, dress up with hot air, and sell for ten. The second shock came when I found out about the freight rates from Earth. I couldn't even import the stuff. I had to do some deep thinking—and fast.

I remembered Zamboni.

The gimmick was as old as the hills and probably older but, as I knew, these things run in cycles. Dress it up, adapt the patter, polish up the dem and today's suckers are as eager to swallow the bait as they ever were. Anyway, I had no choice, it was either that or starve, and I

knew the Selenites wouldn't let me starve—not while I could work.

So I went out and found a partner.

It isn't hard to find someone willing to help. At least it isn't when you offer them a fortune for a little co-operation. Sam owned a small workshop towards the edge of the inhabited area where he tried to make a living by repairing spacesuits and similar junk. He was small, thin, with a nagging wife and a worried expression. He also had a pathetic desire to get rich. I told him what I wanted and he frowned.

"Copper and zinc?" He shook his head. "Not much of those metals about, Dusty. How much would you need?"

"That depends on how many we sell." I'd made him a partner on the theory that a man works better for himself than for others. Also, it saved me having to worry about paying him. Partners can't sue each other for money invested in the partnership. "Say an ounce of each metal per unit. Ten

pounds of each would be enough to make a start."

"An ounce?" He frowned as he thought about it. "How long are these things supposed to last?"

"It doesn't matter. A couple of months would do. Why?"

"If I hot-sprayed the metal over a forme it would look more and still do the job. We wouldn't need as much metal that way, either."

"How much would it cost?"

"The labour wouldn't be much, say about five credits each. The whole thing should run out to about ten credits each."

For a moment it almost shook me, and then I remembered the higher income-expenditure scale on the Moon. Ten credits up here would be worth about five on Earth. I could still sell the item for fifty and not be charging too much.

"Do it your way," I said. "When can I have them?"

"As soon as I can get the metal. Zinc I can do, but not copper."

• "Why not?"

"Metals are restricted here

and I haven't got a licence to buy non-ferrous."

"Then get a licence."

"I can't. They won't give me one." He didn't explain why and I, like a fool, didn't ask him. I thought about it for a moment.

"Lend me some money and I'll get the copper. I know just how to do it."

I did, too. I hung around the landing field entrance until one of the swank, luxury ships came in, and then I had a private talk with one of the cooks. Like all spacemen he was money-hungry and, like all the luxury vessels, the ship had reverted to old-fashioned utensils for the benefit of those gourmands who liked to inspect the kitchens.

For a hundred credits I bought a copper saucepan and everyone was happy.

Sam buried himself in his workshop and, when he came out, he handed me a stack of neatly fashioned units. I decided to call them the Rejuvenator, and I must say they looked attractive. We had made them in the form of a belt so that they could be

worn against the skin under the clothing and no one would know.

I don't know if you've ever met the thing before? The principle is simple, a weak electrical current is generated by the contact of the two metals. As a current it's pretty useless. You can light a dim bulb with it and even ring a bell—if you have the right sort of bulb and bell. To make certain I hid a battery under my coat, taped the wires to my lower arms, and dusted my hands with conductive powder. I collected a few items for purposes of making a flash, hired a corner close to where the tourists and upper-income residents would be certain to pass, and was all ready for business.

I couldn't do wrong.

There's something about an electrical display which is certain to attract people. I flashed lights, rang bells and made the needles of several dials kick right over. I used the hidden battery for all this though, to be fair, the Rejuvenator did produce a current. I proved it, too.

I let a woman actually operate it on the bell, my hands guiding hers, and it was only by accident that they touched the bared wires. Naturally, the bell rang, and she was delighted.

The patter came easy.

"Let me show you the latest discovery of modern medical science," I announced. I rang the bells, flashed the lights, and waited until I'd collected a pitch.

"You all know that the human body contains electricity," I said, and now I didn't shout. There is a reason why a good demonstrator doesn't shout. You talk *to* the customers, not yell *at* them, and, by keeping my voice low, they had to press closer to hear what I was saying. That made it easier for me to pass out the Rejuvenators so that they could handle them.

There's a reason for that, too. If a man is holding your property he's not going to walk away with it. A crowd collects a crowd and . . .

Well, I know my business.

"It has been scientifically

proven," I continued, "that, as we get older, so our electrical potential diminishes. Now, ladies and gentlemen, the Rejuvenator, constructed with elaborate precision of the finest materials and guaranteed to last a lifetime, will restore that natural loss of the body's vitality by means of a continuous trickle-charge of a specific nature adapted to meet the requirements of your cells. I . . ."

I made it last until I felt them becoming restless. Three minutes is about the most you can hold a crowd without hitting the bat, longer than that and they lose interest. I swiftly touched on the various points, hinted at a tremendous increase in vitality, doubled my age and swore that I'd worn one all my life, then got to the point without further waste of time.

"Fifty credits, ladies and gentlemen. For the small sum of fifty credits I can offer you the Rejuvenator complete and ready to wear. Full instructions with every item." I'd had a light-printer run me off a few hundred leaflets on his photographic machine.

"Fifty credits? Thank you, sir."

I shoved a package into a man's hands and, before he could decide whether or not he had actually asked for one, I'd passed out more. It always works and, for the next few minutes, I was busy taking fifty credit notes. The man to whom I'd given the first package cleared his throat and waited until the last of the crowd had slipped away.

"Excuse me."

"Yes?" I was brusque. Talking to him was wasting time and I wanted to collect another pitch.

"You said," he fidgeted and almost blushed. "You said that it increased vitality . . ."

"Certainly it does," I said emphatically. I knew that I had a sure thing here. A man, any man, even one with whom no self-respecting she-ape would be found dead with, always likes to think that he is a second Cassanova. "Wear it next to the skin as instructed. Of course, if you wish for a more rapid rejuvenation, two or more may

be worn at the same time. You'll take three, sir?"

He took two and I watched him scurry into the crowd as if he'd done something to be ashamed of.

Then I returned to work.

To save it getting monotonous I altered the patter to suit the audience. For men I stressed the restoration of vitality, for women the restoring of beauty, for a mixed crowd the life-extending influence of the rejuvenator. I talked so earnestly that I almost began to believe in it myself and so, because of that, I sold more than ever.

Sam, when I went back for more supplies, seemed dubious.

"It's all very well, Dusty," he said, after I had paid him his share. "But I don't like it."

"Don't like what?"

"This business. If they catch me with unlicensed copper I'm sunk. And, anyway, isn't it getting money under false pretences?"

This, after I'd actually paid him! I'd been generous to him, too. I'd only taken half the gross take for personal ex-

penses before splitting the rest five ways. Two for me, two for the store, and the rest for him. And I was paying the cost of the Rejuvenators, too.

Some men are never satisfied.

"Look," I said patiently. "What are you worrying about? The Rejuvenator does produce a current as claimed, and so we are within the law. The fact that the current is so weak that it can't penetrate the insulating properties of the skin doesn't matter. In fact it's a point in our favour, we don't want to electrocute anyone, do we? And it will last a lifetime, no one said anything about it working that long. Stop worrying and get back to work."

"I don't like it," he insisted. "Somehow it doesn't seem right."

Ethics! And just when we were about to make really good money. It was sickening to hear him talk.

We argued for an hour before I managed to persuade him that we were doing nothing wrong. And even then he

wasn't really convinced until I'd paid him back the hundred credits I'd borrowed from him to buy the saucepan. He even hinted that he wanted a larger cut, but I was firm about that. I'd been too generous as it was.

Privately, I decided to find myself another partner as soon as Sam had used up all the copper.

He made it last longer than I thought. It was fantastic the way he managed to spread those few pounds of metal. What he sprayed it on I don't know, but the finished product really looked good.

Within a week I had to shift my stand to make room for the bigger crowds. Within two weeks I'd almost forgotten what a wolf looked like, it was that far from my door. Towards the end of the third week I'd sold a Rejuvenator to almost every tourist and higher-income resident on the Moon and was seriously thinking of importing some De-Fumers from Earth. This, despite the fact that all the Luna atmosphere is air-conditioned. I felt so good that I could have sold anything.

I was busy selling myself the taste of local liquor in the swank, Earthlight Bar, when I got the first hint that things were too good to last.

"Stripped," said a shrill voice behind me. "My dear, I was never so humiliated in my entire life!"

"They actually undressed you?" Her companion, a woman who had long ago dropped all pretence of being less than forty, looked suitably shocked.

"To the skin! Of course I had to cancel my booking. I just had to let the rocket leave without me. My nerves were too shattered to even think of travelling." Her voice rose as she thought about it. "I shall never come to the Moon again. Never! I told them so."

"You did quite right, dear," soothed her friend. "But why? Why did they strip you, I mean?" She didn't seem to be able to get over it.

"I've no idea. They were stripping almost everyone, it seems. It's simply disgusting the way these Lunatics treat visitors. When you think of

all the money we spend here a little courtesy doesn't seem too much to expect."

"Stripped!"

"And robbed. My Rejuvenator, you know the thing I bought from that delightful man, they actually took it from me. I shall have to get another. I simply couldn't be without it now that I've grown used to it. I feel so much more..."

She hesitated for the word. I could have given it to her, but I didn't stop to introduce myself. I didn't stop for anything because suddenly, something had occurred to me.

I went to find Sam. He wasn't in, but a policeman stood at his door, so I kept going. I made just one other call, to my room to collect my suitcase, and then I headed for the landing field—fast.

It took most of my money and plenty of talk before I could persuade the skipper of a Mars-bound cargo ship to take me as passenger. I needed him more than he needed me, because he was taking off immediately and I

daren't wait for a better bargain. At that I only just made it.

In space, sitting in my so-called cabin, I had time to read all the pamphlets the immigration official had given me.

And then I knew what had happened.

Luna is more than just a colony, it's a penal settlement, too. I'd known that but, like most people, I had thought that all the criminals were behind bars. They aren't of course, why should they be? They aren't dangerous and there's no possible means of escape from the Moon. So they're allowed to run loose under general supervision. They do the menial work, the mining, the bubble-maintenance. But they have lots of tourists and residents, too, and they have to have some method of determining which is which.

So each prisoner has a belt rivetted around him. A belt comprised of two metals which generate a current which can be detected by means of the proper instruments. They have these instruments at the embarkation ports.

You get it?

That's right. The Rejuvenator worked on the same principle. Maybe the formes Sam sprayed the metal on had something to do with it, but each and every Rejuvenator registered on the instruments as though the wearer was a prisoner.

And the guards aren't gentle with prisoners who try to escape.

I wondered how many lawsuits would be filed against the Selenites and just how much trade they would lose because of it. I didn't have to wonder what they would do to me if they ever caught me.

That Zamboni!



NON-FICTION

TO DEFINE TRUE MADNESS, by Dr. Henry Yellowlees, is one of those rare books that make a complex subject very clear to the educated layman. Recently there have been many books published in the field of popular psychiatry, but only a few of them succeed in being both understandable and undistorted. One of the greatest dangers with books of this kind is that they may give the impression of having explained a topic, without actually having done so. The reader goes away with a false sense of knowledge—and in the psychiatric field this may have somewhat serious repercussions.

Here, however, after being taken gently through the elementary terminology and

broad conceptual framework of modern psychiatry, we are given a series of lucid chapters on selected mental states that can hardly fail to produce true understanding. Dr. Yellowlees has spent a lifetime caring for and studying the mentally deranged—and a large part of such work consists in explanations to untrained people. His experience in this regard shows on every page of this magnificent book, the sub-title of which is *Commonsense Psychiatry for Lay People*. His straightforward, feet-on-the-ground approach to such topics as the inferiority complex, delusional states, suggestion, hypnotism, anxiety neurosis and insanity-at-law, will surely give the lie to the common idea that psychiatry is a totally “cranky” subject

and that all psychiatrists are themselves mentally off the beam.

It has been said that never before today have so many people lived under such strong mental stresses, much of them self-induced. Dr. Yellowlees' book could be one of the most important forces in bringing this unhappy state to an end. It is one of the wonders of the modern technical age that such an impressive book should cost only half a crown, from Penguin Books Ltd., Harmondsworth, Middlesex.

SCIENCE AND CRIME, by Richard Harrison, is another True Book from Frederick Muller (110 Fleet Street, E.C.4) at 6s. 6d. It is for young people, though many adults will find it exciting, too. The whole range of scientific criminology is covered, but not, of course, in very great detail. The role played by science in various famous crimes is dramatically presented, with quite a bit of scientific instruction on the side. It is a great pity that the illustrations are so poorly

executed and have so little relation to the text. Even so, this book would be quite a good present for a young person possessing a healthy curiosity about the unhealthy subject of crime. Nothing of the nature of what newspapers call a "serious offence" is dealt with.

THE HUMAN BODY, by Cyril Bibby and Ian T. Morrison, is the latest in the splendid series of instructional booklets for young people, put out at 2s. 6d. from Penguin Books Ltd. This one has the usual bright and intelligent text, supported by many illustrations (many of them coloured) of great instructive power. It deals with those aspects of the human body that children ask so many questions about—teeth, food, nutrition, respiration, excretion, the blood system, hormones, reproduction, the sense organs. Definitely not for children only, but also for parents who are not quite sure of the answers. A bargain.

Marie Neurath has written another nice book for children

THE WONDER WORLD OF THE DEEP SEA.

Most of each page is made up of clear and clever illustrations, with a small amount of highly relevant copy. The only thing we don't like about the book is its title. A good many of the species described do not inhabit deep waters and it seems a pity to give the impression that they do. It costs 6s. from Max Parrish (55 Queen Anne Street, W.1).

Hardly a book, but nevertheless well worth mentioning is the latest edition of **ELGER'S MAP OF THE MOON**, revised by H. P. Wilkins. This is printed on a single sheet that opens out to some 20 x 30 inches. The top three-quarters of the sheet comprise the highly detailed drawing of the Moon's surface, and the lower quarter consists of quite a lot of "notes on some notable features on the surface of the Moon." This map is essential for all space flight enthusiasts. It comes from George Philip and Sons Ltd. (30-32 Fleet Street, E.C.4) at only 4s. 6d.

FICTION

EARTHLIGHT is a novel by Arthur C. Clarke in his earlier, undramatic style. The time is two centuries from now and the place is—Clarke's first love—the Moon. Mankind is established on the planets, pioneering days are over; the Moon supports a large colony, an observatory and a zoo. The hero is sent up to the Moon by Security to spy out the land, so to speak, and appears to complete his task many years too late. Clarke has once again appeared to make the error of writing an instructional book on future lunar conditions and trying to masquerade it as a novel. It costs 10s. 6d. from Frederick Muller (110 Fleet Street, E.C.4).

Nothing could be better for the acceptance of science fiction as an intelligent literary form than its appearance under the imprint of a discerning and critical publisher. For that reason alone it is good to see **ANGELS AND SPACESHIPS**, by Fredric

Brown, coming from Victor Gollancz (14 Henrietta Street, W.C.2) at 10s. 6d. This is an anthology of some of Brown's very best stories—seventeen of them, put up in splendid paper, binding and typography. Most of the stories are well-known to devotees, but all of them are well worthy of such permanent form, and they will carry to the public a message stronger than all the propaganda in the world—that science fiction is for thinking men. These stories are considered by Edmund Crispin to be “intelligent science fiction at its fascinating best,” a sentiment with which we are in full agreement. The stories are: *Pattern*, *Placet is a Crazy Place*, *Answer*, *Etaoin Shrdlu*, *Preposterous*, *Armageddon*, *Politeness*, *The Waveries*, *Reconciliation*, *The Hat Trick*, *Search*, *Letter to a Phoenix*, *Daisies*, *The Angelic Anglemorm*, *Sentence*, *The Yehudi Principle* and *Solipsist*.

NOT THIS AUGUST, by C. M. Kornbluth, as a story, is as excellent as most material from this author. But we can

only deplore the irresponsible political sense that has served as a springboard for the plot. It's a story about America—an America which has had to capitulate in a world war (Europe, including England, has thrown in the sponge long before) and has had to accept the harsh conditions of surrender laid down by General Novikov, of the Soviet Military Government, and General Feng, of the Chinese People's Republic.

We would be the last to demand that literature carry a message, but we are among the first to require that if a message *must* be carried, then let it be one that at least has the chance of doing some good in the world. The message carried in this book may produce frustration and distrust in the people with whom we hope to live peacefully, and may provide selected grist for the irrational mills of those mental defectives who believe that only the West knows what's good for the world. The plot is largely concerned with the subversive activities of a tinpot hero who tries to “fan the spark of American

defiance." From Doubleday at \$2.95.

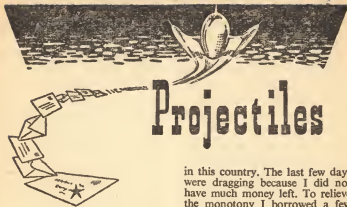
Rich & Cowan have published two science fiction books that are good for the quick read when you don't want to think too much about what it all means. **A HANDFUL OF DARKNESS**, by Philip K. Dick, is a collection of stories, many of them fantasy, concerned with various aspects of this world. They are all good—and many of them *can* be thought about if you wish to. Unfortunately, they are rather two-dimensional, as though Mr. Dick has not yet reached the degree of worldly experience that makes a writer write with depth. Even so, we recommend this book. It costs 10s. 6d.

SCREAM FROM OUTER SPACE is the unhappy title of the second book, by John Robert Haynes. This is all about the investigation by a group of Earthmen of a planet called Diana. Diana "made her first startling appearance in the solar system" eight years before the story opens in the year 2020. Astronomically and scientifically, the whole book doesn't make sense, but if you are not worried about that sort of thing, and if you like a sprinkling of meaningless alien terminology in your reading, then you may enjoy this peculiarly adult space opera. It costs 8s. 6d. Both this and the previous title can be obtained from Rich & Cowan (Stratford Place, W.1).

THE LADY AND THE BULL

is the title of next month's lead story by popular author J. T. McIntosh. Short stories by H. K. Bulmer, E. C. Tubb, Martin Jordan. Illustrated non-fiction features by scientific experts.

AUTHENTIC ————— A MONTHLY MUSTI



Projectiles

OVERSEAS SECTION

ONLY MURDER

I am a regular reader of your *Authentic* and it is a good one. It is a pity that it is full of only murder sf. The other stories about space and rockets are not found in it. I think the murder sf stories should be decreased in number. Every story should have at least one illustration. I would like to have a pen-friend who is interested in science fiction, comics and astronomy. I am a boy of 17 years. I would also like to exchange sf novels and magazines. Any offers? Satish Avasthi, S.D. College Hostel, Hoshiarpur, Punjab, India.

Well, we don't know about that, Satish. We don't run all that many murder stories, surely? Not mixing us up with some other magazine, are you? Hope you get your pen-friend.

EVERY COPY

I have only been interested in science fiction since my first leave

in this country. The last few days were dragging because I did not have much money left. To relieve the monotony I borrowed a few books. One, *The Green Hills of Earth*, was quite unlike anything that I had ever read before. It interested me a great deal. I was impressed by the vast fields of this type of fiction. I wanted to find some more books like it.

In this country it is very easy to get American printed books; this means that as a new sf fan I had a good chance to compare the American and British sf monthlies. You can be very proud because my favourite sf monthly is *Authentic*. At first I was rather disappointed by the layout and poor quality paper. However, who cares if diamonds are wrapped in rough paper?

Since February, 1955, I have hurriedly bought every copy of your magazine that I could find. I will never regret the time I have spent reading and re-reading them. To my mind most American authors tend to forget they are writing fiction; as a result their stories tend to become an account of the probable future development of some branch of science. Your magazine has struck a balance

between fiction and technical stories and/or articles which few American magazines can hope to achieve. Also, your articles are always written in plain language which is free from technical jargon.

There are two improvements which I would like to see in your magazine: (1) a better quality paper; (2) the use of a single column layout instead of the present double one.

I know that you don't want Projectiles turned into a "Pen Pal Wanted" column, but I would like to have a pen-pal who is interested in sf and record collecting. Could anyone interested please write to me at 78 Charlton Road, Andover, Hants. I can assure anyone who writes that every letter will be answered.

B. People, Kuala Lumpur, Malaya.

Nice to hear from you, Mr. People. Hope you are on your way home now. If we gave you better paper, you'd have to pay more for it. If we gave you single column, we'd have to use larger type, and you'd get less reading matter. Glad you like the rest of us, and we're sure you'll get lots of pen-pals.

WHY SPACE TRAVEL?

I am a science fiction fan and I consider your magazine one of the best. There are too many good sf magazines to say which is the best.

Although I agree with Mr. Stuart that we shall have space travel, I don't agree with all his reasons.

1. The world at present is concerned about over-population, but there are many fertile, unexplored lands that could be put under cultivation, parts of South America, for instance. Scientists are

trying to find cheap, wholesome foods that can be grown quickly and easily. Has Mr. Stuart ever heard of algæ? We can begin work against a starving population now. It will be many years, perhaps generations, before we'll even reach the Moon, let alone cultivate the planets.

2. I agree with you absolutely.

3. We have been alone so long and still fight amongst ourselves—how can we hope to make peace with an alien?

4. I agree with you, entirely, but will the average taxpayer?

5. This is the worst reason. When has mankind ever been willing to share power. If one nation alone gets to the Moon they may make sure that no other nation does so. That will unite the world, certainly—against the lucky first—but they would be powerless.

For this reason I think space travel should be made the concern of the United Nations.

Miss J. Anderson,
26/19 Bayswater Road,
Kings Cross, N.S.W., Australia.

Thank you for thoughtful letter, Miss Anderson (Joan, Jean Joyce?). The more contributions we have on this vital topic, the better we like it. One thing we would say ourselves, though, is that we can't see space travel ever coming to pass unless it becomes a United Nations' concern.

HOME SECTION

THE HUMAN WAY

I enjoyed the *Big Hop* very much. It's nice to find characters in sf who are not two-thirds paranoid. It gets depressing, especially to a woman reader, when the hero acts

like an overgrown schoolboy, and a not well-mannered one at that. What also annoys me, especially about American stories, is that Big Bosses, or Heads of State, talk schoolboy slang all the time, and have no sense of dignity. This is very unreal and a great failing in many of the stories I have read.

I must say I do like the articles. They are most instructive, and raise your book to a higher level than the "penny dreadful" which is usually cast for sf. Remember, if you wish to widen your range of readers, you will have to agree that the larger proportion of the population consists of adults, who like adult stories, and have no time for the paranoid types that sometimes have been cast for a leading role in a lot of sf stories, whose only reaction seems to be, "if it's strange, kill it." Why are we so sure that the human way of life is right, after all? To look at our past, a little thought would give some doubt to this. I am glad to see that this thought is sometimes reflected in sf stories by British authors.

V. Micheal,
22 Routh Road, S.W.18.

Hope that's the way you spell your surname, lady. Couldn't read it (Valerie, Veronica, Vera, Victoria?) You ladies seem to do all the thinking these days. Keep it up.

NO PADDING

I am forced to take up my pen (in this case typewriter) once again upon reading your editorial in No. 59. Now it's about this rise of price to 2s. I don't mind paying it

if I get something worth paying for, but please no more articles. Let's have 32 more pages of SCIENCE FICTION and not "padding" as R. J. S. Edwards so aptly put it in this issue of Projectiles.

Authentic has been needing a shot in the arm for some time. It's been going from bad to worse in the fiction section, so I hope that the extra 6d. on each magazine sold will enable you to get some authors who can really write. Of course, when I say this, I don't include E. C. Tubb or Charles Eric Maine—just those new names I have never heard of and don't wish to again.

Sorry if, whenever I write, it always seems to be complaints, but I do think you could have more fiction. I know you say that articles are what readers want, but I'm beginning to think there are no real fans that read *Authentic*, just people who buy it for articles. Michael R. Birrell, 33a North Street, St. Leonards-on-Sea, Sussex.

What a selfish blister you are, Michael! So we should fill the magazine with stories by authors you have heard of? So we should leave out all the articles? What happens when the authors you have heard of die or disappear? We've always given a welcome to new authors and we always will. We've always had articles and we always will. Because the main mass of readers want them. And will you and every other perishing grumbler-along-these-lines get it into your heads that Authentic carries as much fiction as any other British sf magazine! The non-fiction is extra. Call it free, but don't call it "padding!"

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Miss M. J., Denbigh.

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